

S
90
86
83
69
94
78
77
83
88
IV
79
81
2
75
77
84
83
68
1
77
89
81
85
75
96
89
82
87
87
70
93
90
71
85
85
87
89
4, 93
83
87
79
85
III
75
79
95
85
77
76
83
77
77
89
85
84
72
73
67
87
77
89
88
90
4
93

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Contents

Editorials	7
Amateurs Increase Twenty Per cent in Year	8
An Unorthodox Receiver	Ross A. Hull 9
The Important First Choke in High-Voltage Rectifier Circuits	F. S. Dellenbaugh, Jr., and R. S. Quimby 14
The 'Phone Bands Are Modified	K. B. Warner 20
Some Appreciated Assistance	23
Which Tube for the Crystal Oscillator?	George Grammer 24
Rotten Young Squirts	The Old Man 27
The F. R. C. Reports on the Amateur	29
Armistice Day Message — 1931	31
Election Notice	31
A Reversed-Current Feed-back Oscillator	Walter van B. Roberts 32
The Roanoke Division Convention	(Report) 33
The Type '39	34
Election Results	35
Book Reviews	35
New Portable Receiver	36
A Direct-Coupled Amplifier for the Dynatron Oscillator	E. G. Fraim 37
Standard Frequency Transmissions	38
International Goodwill Contest	39
Amateur Radio Stations — W8CPC, W7AME, W2BPD	41
The Southeastern Division Convention	(Report) 43
Experimenters' Section	44
HANDY COIL MOUNTING, THE TWO-TUBE DETECTOR, THE TYPE '38 AS A DETECTOR, AN ANTENNA SUGGESTION, BREAK-IN WITH CRYSTAL CONTROL, PLUG-IN RADIO-FREQUENCY CHOKES, THE B. C. SUPERHET FOR CALIBRATING, CUTTING ROUND HOLES IN ALUMINUM, A CHEAP LEVEL INDICATOR, SIMPLIFIED TUBE KEYING	
The Communications Department	47
Calls Heard	61
I.A.R.U. News	62
Correspondence Department	64
Hamads and QRAs	91
QST's Index of Advertisers	96

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Kenneth B. Warner (Secretary, A.R.R.L.), Editor-in-Chief and Business Manager; Ross A. Hull, Associate Editor; James J. Lamb, Technical Editor; George Grammer, Assistant Technical Editor; Clark C. Rodimon, Managing Editor; David H. Houghton, Circulation Manager; G. Donald Meserve, Advertising Manager; Ursula M. Chamberlain, Assistant Advertising Manager.

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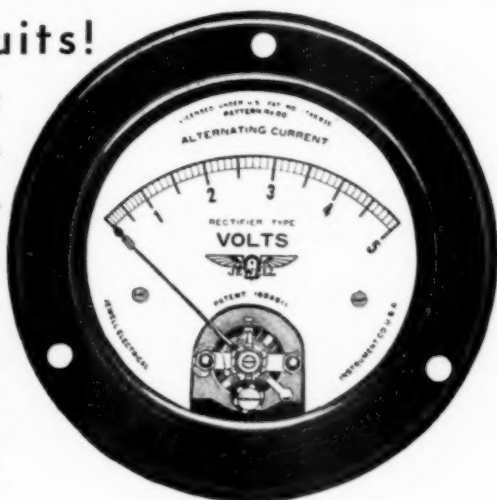
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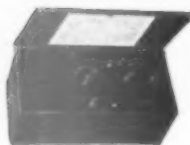
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It is an incorporated association without capital stock, chartered under the laws of Connecticut. Its affairs are governed by a Board of Directors, elected every two years by the general membership. The officers are elected or appointed by the Directors. The League is non-commercial and no one commercially engaged in the manufacture, sale or rental of radio apparatus is eligible to membership on its board.

"Of, by and for the amateur," it numbers within its ranks practically every worth-while amateur in the world and has a history of glorious achievement as the standard-bearer in amateur affairs.

Inquiries regarding membership are solicited. A bona fide interest in amateur radio is the only essential qualification; ownership of a transmitting station and knowledge of the code are not prerequisite. Correspondence should be addressed to the Secretary.

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• EDITORIAL •

AT LAST — in fact "at long last," as the moompitcher title-writers used to put it — the 'phone bands have been changed, the "80-meter" 'phone sub-band widened. We print the details in an article in this issue. Let there now be loud rejoicing on every hand, for here, after years of travail, is a mutually-agreed-upon solution to the toughest problem that ever confronted amateur radio. We believe that every amateur will join us in the fervent hope that the new arrangement will be found satisfactory to everyone concerned and that it will serve for the indefinite future — until changing conditions warrant some other sort of plan.

We have just been browsing back through our old records and find that this question of 'phone vs. c.w. has been a live one for eight years or so. And of course we are very much aware that at the last four annual meetings of our board it has occupied much more time and attention than any other subject in amateur radio. To most of our problems there is only one right answer, and a more or less clearly visible one; but the 'phone question has been a peculiarly difficult one because, like Prohibition, it is essentially incapable of a direct solution that will impress everyone with its self-apparent correctness. For its solution it has required a "plan," based on careful study of data and statistics, arrived at in an atmosphere of meticulous justice to 'phone and c.w. alike. After years of the most painstaking scrutiny, a plan so conceived was brought forth by the A.R.R.L. Board at its last annual meeting, as was reported in July *QST*.

Headquarters moved at once for its adoption at Washington, and the way apparently was all set for action by the Commissioners before their summer vacations, when bingo! a small group of over-ardent 'phone amateurs filed an objection to this and that, put the matter in controversy, and threw a short-circuit on the whole works. There it hung, all summer, all fall. About that time other 'phone amateurs, wondering why A.R.R.L. didn't keep its announced promise, found out that some of their own number were responsible. We understand that some of the things that were then said would put permanent crimps in any microphone ever devised! At any rate, the over-ardent 'phonists in question changed their plea to a support of the A.R.R.L. plan, we sailed again to Washington, and just four days later the Commission enacted the board's proposals. It is unfortunate that the change wasn't made early enough to be effective from the coming of cool weather last autumn, but both the League and the Commission have been desirous of making the amendment and it wasn't the fault of either that it was delayed; it was felt that if anyone really wanted to object to the plan, he had the right to be heard, even if he did cut off the radiation meanwhile. Happily, it's all over now. The one unfortunate effect is that it will necessarily be April 1st before the new plan is effective.

Nobody is claiming that this new 'phone arrangement is the one perfect solution of the problem. Perhaps it won't satisfy everybody. It must be stoutly said, though, that it is the best solution possible to-day, arrived at with sincerity and only after the most exhaustive kind of study, and that it has a great many splendid merits. Let us all accept it as the present end of our past differences on this question. We must face the world this year as just *one* group of radio amateurs, all for one and one for all.

K. B. W.

Amateurs Increase Twenty Per cent in Year

Mr. Terrell Reports on Our Growth and Activities

EACH year we watch avidly for the annual report of Mr. W. D. Terrell, Director of Radio of the Department of Commerce, to see the official figures on the growth of amateur radio. This year we knew, from the volume of our work at Headquarters, that there was certainly something doing in a big way. This Mr. Terrell confirms. On June 30, 1931, there were 22,739 licensed amateur stations in the United States. A year before there were 18,994. The increase is 3,745, or nearly 20%. Hot zig-zag! Increased radiation and a louder signal!

Mr. Terrell speaks very favorably, too, of the work of amateurs and our A.R.R.L. We reproduce that part of his report dealing with amateurs:

"The past fiscal year shows increasing interest on the part of amateurs. In 1929 there were 16,829 licensed amateur radio stations, in 1930 there were 18,994, and this year there are 22,739. These figures indicate that the amateurs are by far the largest users of transmitting radio stations in the United States. In addition to the licenses issued to the amateur stations, correspondence with the Radio Division shows that there are more young men making inquiry with reference to obtaining such licenses than in any previous year. It is believed that this growing interest may be attributed to the use of the radiotelephone by amateurs.

"The amateurs have given much attention to attaining frequency precision and control of their apparatus. The standard frequency system sponsored by the American Radio Relay League, and inaugurated last year on a nation-wide basis, has been continued during the fiscal year just ended. As high as 300 calibrations a month have been reported from this service. The benefits derived from these standard transmissions sent by the amateurs themselves are not confined to the amateurs in this country. It is reported that many foreign amateurs, particularly those in South Africa and Australia, have been utilizing these transmissions on the higher frequencies.

"With such a service regularly available, considerable interest has been evinced in the popularization of measuring equipment of a standard comparable in accuracy and stability to the transmissions, and yet within the financial and constructional abilities of the average amateur. The American Radio Relay League reports that their laboratory work has resulted in the development of dynatron oscillator equipment which fulfills these specifications, affording tolerances well within 0.1 per cent and still easily constructed and calibrated. With such equipment available, together with the transmissions supplied by the

standard frequency stations, large numbers of amateurs have built and now possess measuring apparatus equal to that in many laboratories. The good effects have been apparent. In line with their long established self-policing policy, the amateurs have created a system of official observing stations, the amateur stations so appointed being equipped with reasonably accurate measuring apparatus for regularly observing and reporting any off-frequency violators among the amateur ranks. The American Radio Relay League reports that approximately 100 appointments have been made.

"The communications possibilities of frequencies on the order of 56,000 kilocycles have been examined and considerable development work accomplished in the design of radiotelephone transmitters and special receivers of the superregenerative type to work on these frequencies.

"While no major emergency occurred in the United States to enable the amateurs to participate in the storm relief work for which they have been noted in recent years, greater coöperation has been afforded to more than a dozen expeditions sailing from the United States, and increased activity is reported in connection with the Naval Radio Reserve and the Army Amateur Radio System.

"The monitoring stations of the division are regularly engaged in measuring the frequencies of amateur stations. Comparatively few violations have been found and only a few have been penalized for such violations. It seems evident that the amateurs realize that their future success and public good will depend upon the operation of their stations in an orderly manner, having due regard for other users including the broadcast listeners. When a new amateur enters the field his transmissions are usually observed by the older amateurs who take such action as may be necessary to bring him in line with the self-policing policy of the organization."

Strays

MNI TNX, FELLERS

The Headquarters Staff acknowledges with deep appreciation approximately one bushel of holiday greeting cards and messages from hams all over the world. They added greatly to our Christmas cheer. Many thanks, gang, and much Happy DX to you!

K. B. W.

An Unorthodox Receiver

Considerations Involved in Planning and Building an Advanced Type of High-Frequency Set

By Ross A. Hull, Associate Editor

IT SHOULD have been possible for us to stay away from receivers for many moons yet to come. We tried hard enough. But in a fit of frenzied despondency following a futile attempt to copy some important DX, a new, bigger, better set was conceived. That sort of thing *will* happen. Under the circumstances, inevitably, there is only one possible course of action — to build the thing. The anguish experienced in locating suitable components, the torment of working against time, the distress involved in eliminating the inevitable idiosyncrasies (better known as bugs) all serve to flatten the enthusiasm, to temper the egotism and, sometimes, to produce a good receiver.

There was one redeeming feature on this particular occasion: no self-imposed limitations clouded the issue. We wanted just as effective a set as we could build, irrespective of how complex or how simple it might turn out to be. The demand was only that it should perform as well as any ham set could; the hope, that it might perform a little better.

Although the finished receiver is not particularly complicated, as the illustrations well show, it is no set for the tyro. Ambitious but inexperienced amateurs who attempt its duplication will be making a beeline for trouble.

Advanced amateurs, on the other hand, may consider the receiver worthy of attention. Though they may not care to copy it to the last screw, it does seem possible that the design might stimulate interest in the improvement of equipment for the receiving department of good amateur stations. Since this article is likely to be of interest mostly to experienced workers, we will skip much of the

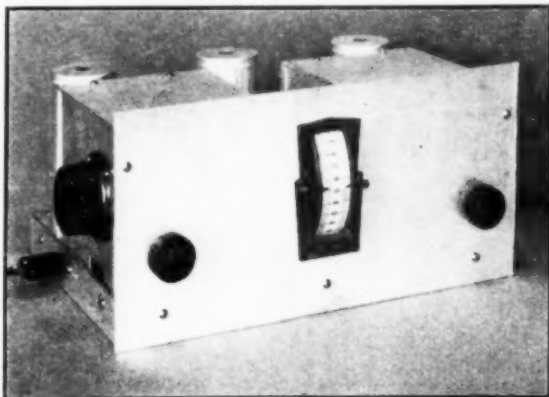
detail. Instead, we will explain the process by which we arrived at the present design, the justifications for its few unconventionalities and the characteristics of the receiver built around it.

In the first burst of enthusiasm the receiver was visualized as a highly reliable though flexible affair in which the merit of absolute simplicity of control would not be obtained at the expense of performance. It would be a three- or four-tube gadget possessing high sensitivity, a very effective volume control, all the comforts of home and none of the discomforts. There would be no extraneous noises whatever; there would be no "pulling" between the r.f. stage (if any) and the detector; the regeneration control would not detune; the control knobs would be conveniently placed; operating the set even on the most crowded amateur bands would be pure bliss.

Of course, there were fundamental decisions to be made. We dismissed them in quick time. The set would have a.c. type tubes operating with a.c. filament supply simply because a storage battery, in this day and age, was unthinkable. It would have battery supply for the plates because a "mains" supply, with its fluctuating voltage, just would not do. A single tuning control would be essential and some radio-frequency ampli-

fication, with its many established advantages, would be unavoidable. The set would be a little "roomier" than usual. Construction would be carried out with particular regard for mechanical and electrical reliability. We would force ourselves to regard lock-washers under all nuts of equal importance to soldered joints in all wiring.

The first real problem was a decision as to the



A GENERAL VIEW OF THE FOUR-TUBE RECEIVER

The home-made escutcheon, cut from heavy aluminium, painted black and etched with a few lines for effect, is not by any means an essential. The tuning knob at the side is provided to make tuning of the set a more comfortable process than it ordinarily is. Below the tuning knob is the volume control disk, mounted horizontally and projecting through a slot in the shielding.

type of r.f. amplifier. To tune or not to tune, that was the question. We realized that, while an untuned stage would not give the same amplification as a tuned stage, the untuned stage had the enormous merit of requiring no inter-stage shielding. Although a tuned amplifier would help to make a better receiver, it would weaken the pocket-book and impose constructional hazards. The problem of interference from near-by broadcasting stations with the untuned amplifier did not enter the picture. We had already observed the splendid effectiveness of a choke in place of the more usual resistor in the input circuit.

The final outcome was a decision to break away from convention to the extent of using both an untuned and a tuned r.f. amplifier. The tuned stage would justify its complications by providing r.f. gain and selectivity for 'phone work. The untuned stage would earn its existence by allowing the possibility of effective single-control of the two tuned circuits without the complication of compensation for the loading effect of the antenna on the first tuned circuit. With an audio stage this would mean four tubes—but what of an odd tube or so at something like a dollar per each? If anyone should wish to be shown loud DX signals there would then be no doubt about our ability to supply.

Naturally, we withered at the sight of the shielding ogre, inseparable companion of tuned radio-frequency amplifiers. We had folded too much aluminium, drilled too many holes and made too many unsatisfactory shields not to have become somewhat shielding-shy. But then a "last-word" receiver was the aim. Shielding or no shielding, there would have to be a tuned r.f. amplifier with a single tuning control if only because we had never attempted a "ganged" r.f. affair before.

Which brings up the matter of tuning control. Most amateurs of our acquaintance appear to believe that a single-control, tuned-r.f., high-frequency receiver can be built satisfactorily only if recourse is had to elaborate equipment for the matching of inductances and capacities. They think, too, that threaded coil formers are essential. We agreed with them until experience with this receiver convinced us that even with plain formers and no measuring equipment the single-control bogey was a harmless creature. With a little careful coil jiggling we obtained unexpectedly effective "tracking" over the amateur bands. That was a relief.

Rounding off the design for the set was a simple matter at this stage. Because of its widely recognized effectiveness as a detector, the Type

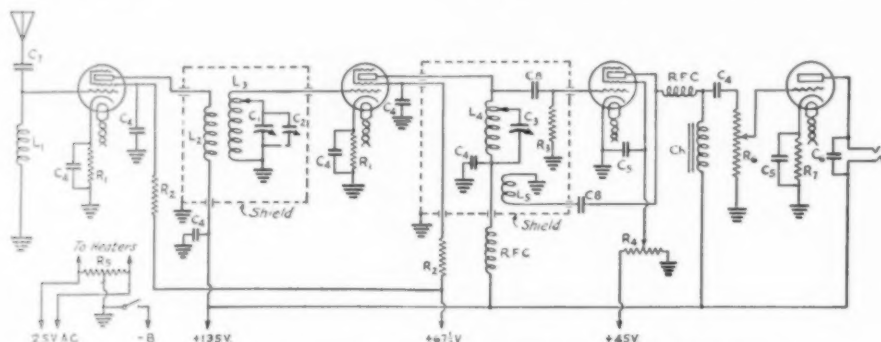


FIG. 1—THE COMPONENTS AND CONNECTIONS OF THE RECEIVER

The necessary parts include:
Aluminium base 8½ by 13 inches with 1¼-inch cavity under.
Aluminium panel 13 by 6½ inches.
Two standard type shield boxes 5 by 6 inches and 4½ inches high.
Four tube shields—one for the second r.f. tube of heavy metal without air vents.
Three Type '35 or Type '51 tubes and one Type '27.
C₁, C₂—Two General Radio Type 568-K, 50-μfd. variable condensers.
C₃—25-μfd. midget variable condenser.
C₄—0.01-μfd. fixed condensers (mica dielectric).
C₅—5-μfd. fixed condensers (paper dielectric).
C₆—0.01- to 0.03-μfd. fixed condenser (experiment desirable).
C₇—Small coupling condenser useful with long antenna—two ¾-inch square plates 1/16 inch apart.
C₈, C₉—100-μfd. fixed condensers.
R₁—500-ohm fixed resistors, 2-watt type.
R₂—10,000-ohm resistors, 1-watt type.
R₃—5-megohm gridleak.
R₄—50,000-ohm regeneration control potentiometer.
R₅—50-ohm center-tapped resistor.

R₅—500,000-ohm tapered type volume control potentiometer.
R₇—2000-ohm resistor, 2-watt type.
R.F.C.—Usual short-wave type chokes. A 5000-ohm resistor in place of the detector plate choke will often be found effective.

Approximate Details of the Coils

Winding	14,000 kc.	7000 kc.	3500 kc.	Size Wire
L ₁ , L ₄	9	18	31	No. 22 d.s.c.
Tap, turns from bottom	3	7	21	
L ₂	7	14	25	No. 34 d.s.c.
L ₅	3	3	5	No. 34 d.s.c.

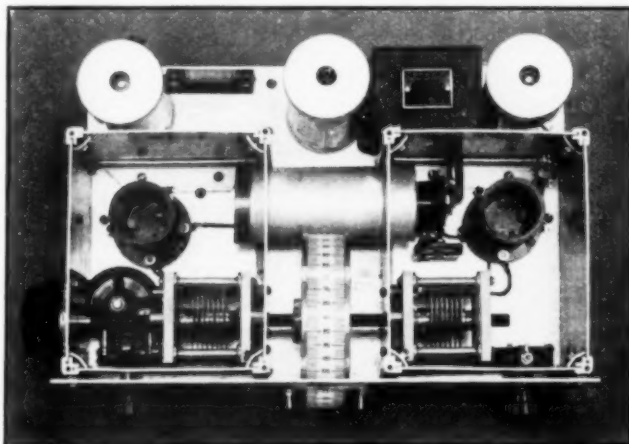
The windings are spaced about ½ inch and all are wound on National coil forms. No spacing is used between turns. It is certain that some modification of these figures will be necessary in individual cases. Final matching of L₁ and L₄ may be made by slight spacing of end turns or by variation of turns in L₁. L₁ comprises about 90 turns of No. 28 wire on a small piece of hard rubber rod ¾ inch diameter. It may be seen mounted in gridleak clips alongside the first r.f. tube.

'35 screen-grid tube would be put to work in that rôle. It would be followed by a single Type '27 audio amplifier, anything livelier than that being considered quite unnecessary. Coupling between the detector and audio tubes would be either of the resistance or choke variety with a leaning toward the latter because of its ability to feed the detector without involving a severe plate voltage drop. An audio band-pass filter would not be incorporated in the set itself because of our personal preference for an external filter-amplifier unit (already on hand) to be plugged into the output. Lastly, the set would have a good volume control located, as experience had shown us to be desirable, in the input circuit to the audio amplifier. The control itself, it was decided, would be located so that it could be operated conveniently by the same hand that does the tuning.

From all these random suppositions it was a simple matter to cook up the circuit shown in Fig. 1. Let's have a look at it. The first tube is a conventional "untuned" r.f. amplifier fitted, however, with the small r.f. choke L_1 instead of a resistor in the grid circuit. With a resistor, severe interference in the nature of cross-modulation is had from the two local broadcasting stations. With the choke, this trouble is eliminated entirely. The antenna coupling condenser C_1 is not an essential companion for L_1 . It is necessary only when a large antenna must be used with the receiver. The usual pair of $\frac{3}{4}$ -inch square metal plates about 1/16-inch apart well serves the purpose. The r.f. tube itself is a Type '35 provided with bias by the usual resistor R_1 , by-passing being accomplished (as it is in all the r.f. circuits) with a .01- μ f. mica dielectric condenser. The screen-grid, similarly by-passed, is fed through a de-coupling resistor R_2 . Coupling between this tube and the second Type '35 r.f. amplifier is through the transformer $L_2 L_3$. A transformer is used in this position instead of the more usual single tuned circuit to provide some slight control over the selectivity of the r.f. amplifier and to aid in the problem of lining up the two tuned circuits. All contacts of the five-pin coil formers are utilized, the fifth serving to establish contact between the tap on the coil and the stator of the tuning condenser C_1 . This arrangement of tapped coils for band spreading, by the way, was decided on for this receiver since it is the one practical way of attaining any desired band-spread without meddling with the tuning ca-

capacity. In any receiver using plug-in coils with two or more ganged condensers, this feature is naturally of great importance.

The plate circuit of the second r.f. amplifier differs from that of the first in that it feeds into an auto-transformer instead of a transformer. This "untuned-plate" arrangement is used be-



WITH THE SHIELD COVERS REMOVED: A PLAN VIEW

Sheet aluminium with aluminium angle pieces was used throughout in the construction of the chassis. Spring washers under all nuts aided in avoiding any loose contact between metal elements. The main tuning shaft is of bakelite, the rotor of the right-hand tuning condenser being above ground potential. The arrangement of the shield box corner clamps can be seen in this illustration.

cause it requires only three of the five coil former pins (two remaining for the tickler), and because it simplifies the coil construction problem. The only apparent weakness we could discover in this "tuned-plate" coupling scheme is the existence of an appreciable voltage across the condenser C_3 . If the condenser is not an excellent one, noisy operation is sometimes the result. Careful selection of the grid condenser is an obvious precaution to take. Other important components in this second r.f. stage are the de-coupling resistor R_2 , the plate circuit radio frequency choke and the screen and plate by-pass condensers.

The Type '35 detector, to get moving again, is arranged for grid circuit detection and regeneration is provided by the tickler coil L_4 coupled through the fixed condenser C_5 . Regeneration is controlled by adjustable screen-grid voltage obtained from the potentiometer R_4 . This form of control was chosen "blind-folded" from the several similarly effective methods known to the art. For the detector-audio coupling, we eventually decided upon choke coupling. $Ch.$ is the choke and C_4 the condenser of a National coupling unit. It feeds slam into the resistor of the volume control R_6 from which signal voltage of the desired level is picked off and fed to the audio

tube grid. That tube (a Type '27), with its associated equipment, is rigged in a perfectly normal manner. Completing the circuit is a center-tapped resistor R_3 across the tube heaters. Its tap, like all other leads shown "grounded," connects with the metal chassis.

By itself, of course, this or any other receiver circuit does not mean much. What difficulties we did run across in building the set resulted not from characteristics of the circuit but from

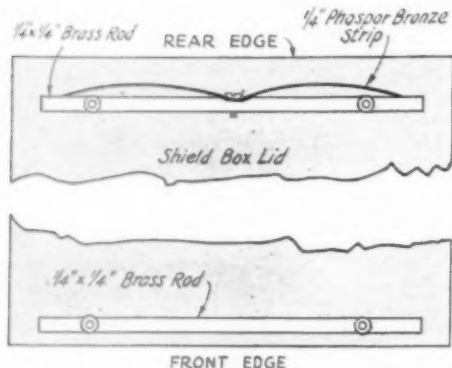


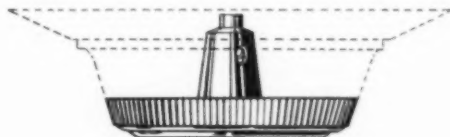
FIG. 2

electrical and mechanical weaknesses in components. It would be well, perhaps, if more amateurs paid less attention to circuits and more to the details of mechanical construction and wiring. A receiver of this type is destined to be virtually a white elephant unless it is built with the strictest attention to detail.

In scratching around with many pens and much paper we eventually arrived at the lay-out shown in the photographs. It is not by any means perfect but it is at least one of the satisfactory methods of assembling the components. In it we endeavored to hold closely to the ideal lay-out from an electrical standpoint departing from it only in the interests of convenient control location. The foundation for the set is an aluminum plate with a $1\frac{1}{4}$ -inch cavity underneath in which almost all wiring and most of the fixed condensers are contained. Above it, two standard Alcoa shield boxes provide compartments for the two tuned circuits. We had been hesitant, at first, to use these boxes in spite of their relative cheapness and convenience. Early experience had shown that much trouble could result from noisy contact between the walls and corner pieces. It was decided to use them only after preliminary experiment had shown how readily the trouble could be avoided by fitting simple corner clamps. The clamps used consist of pieces of heavy aluminum sheet $\frac{3}{4}$ by $\frac{3}{4}$ inch, drilled at the centers and held in place "catty corner" by machine screws passing through the corner posts at 45 degrees to the plate of the walls. The

fitting of convenient lids for these shield boxes was another problem to be overcome. The necessity for frequent coil-changing called for lids which could be removed readily, while the avoidance of loose contact between surfaces demanded something substantial. The fitting shown in Fig. 2 filled the bill. On both the front and rear edges of the lid, a piece of $\frac{1}{4}$ -inch square section brass rod is screwed. The rear piece is then fitted with a bowed strip of fairly heavy phosphor-bronze or spring brass. This is shoved up against the rear wall of the shield box as the lid clicks into place. It works.

With the idea of getting the best possible isolation of grid and plate circuits in the tuned r.f. amplifier, the '35 was mounted in a horizontal position inside a cylindrical tube shield connecting the two shield compartments. The tube itself was cut from a heavy aluminium tube shield of the usual type and rests securely in holes in the box walls cut exactly to the right diameter. These holes, by the way, are not difficult to cut with an ordinary expanding bit providing the work is kept thoroughly lubricated with oil. Each hole is only a five-minute job under these conditions. The tube shield is, of course, fitted with a lid at the grid end. It was made up with some thin sheet brass. At the other end, the shield is left open. Near it, the tube socket is mounted to the base plate with a heavy brass angle bracket. In other respects the construction is all straight shooting. The UY-type coil sockets are mounted to the base; the two General Radio tuning condensers to the side walls of the shield boxes. The trimmer condenser sits on the front wall of the left-hand shield box — the regeneration control resistor on the right-hand box. Outside the shields there are the input r.f. tube at the left corner of the base, convenient to the first tuned circuit, and the detector on the right corner adjoining the second tuned circuit. The audio tube is between them. Alongside the untuned r.f. tube is the input coupling choke



Showing portion cut from 4" dial for the volume control knob.

FIG. 3

Between the detector and audio tubes is the National audio coupling unit.

It is in the tuning control placement that convention is not followed. The tuning knob, lo and behold, is fitted at the left side of the receiver. In that position, experience attesting, it is infinitely more convenient than on the front of the

panel. Manipulating the knob with the left hand is a surprisingly natural process and, as the cover illustration shows, leaves the table top in front of the receiver an open space on which to copy traffic. The amateur who writes with his left hand could quickly modify the arrangement by extending the tuning condenser shaft to the right side and fitting the knob at that point. The control is naturally not a simple knob. It is the knob and vernier drive taken from a National Type "A" dial. The tuning indicator is an ordinary drum taken from a defunct dial. It is so mounted that much more of its surface projects through the panel than ordinarily. The idea in this case is to obtain something approaching full-vision tuning so that the location of any signal with respect

to the limits of the band may be estimated instantly. The usual drum dial, exposing only a few degrees at a time, has often been found inconvenient. At a hasty glance it is usually far too easy to mistake the one exposed number for 30 or 60 when in reality it is 80. This exposure of the drum's surface, of course, called for a new escutcheon. That used on the receiver was cut from a piece of aluminium, painted a dull black and scratched with a few lines for aesthetic effect. The indicator was rigged in the form of a wire supported between two machine screws and fitted at each end with triangular shaped wings.

Immediately below the tuning knob and also on the side is the volume control. The control itself is in the form of a disk projecting slightly through a horizontal slot in the wall of the shield box. The control is slightly behind the center line of the tuning knob, in which position it can be operated most conveniently with the third finger of the hand that does the tuning. With a little practice, the operation of the volume control becomes almost automatic. The practicability of simultaneous manipulation of both tuning and volume controls leads one, without thinking, to cut down excessively strong signals as one tunes into them. Lacking the facilities for turning and milling a disk for the control, one was improvised by cutting the front of the knob from an ordinary plain bakelite dial, retaining the

shaft bushing and set-screw. The resistor itself is mounted under the base plate with its shaft projecting upward into the left-hand shield box in the position shown in the photograph.

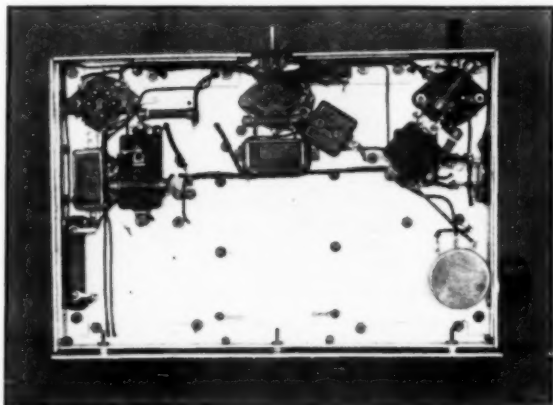
Need more be said about constructional details? We think not. Any amateur possessing the experience in set building demanded by a project

of this sort will surely be able to grasp the remaining features of the design. In the actual assembly, particular regard was paid to the necessity for making the path of by-pass condensers to ground as short as possible. Unusual care (for us) was also taken with all insulation and with the placement of r.f. leads. Further, we made quite certain that all nuts used in the assembly were fitted with lock washers. As a result, the receiver

gives all the first indications of a degree of reliability not found in many of the sets we have operated.

The one remaining problem is coil winding. Though the actual windings found desirable for this receiver are given in the table, it is more than probable that changes will have to be made to suit individual sets. One satisfactory procedure will be to wind the coils according to the table, taking extreme care to see that the L_3 and L_4 coils are mechanically similar. With the set in operation, it will usually be found that, with the trimmer condenser set at about the half-way mark, C_1 must either be tuned above or below C_4 before the two tuned circuits come into resonance. Should the inductance of L_3 be shown in this way to be insufficient, it is merely necessary to take off one or more turns from L_3 . The reverse also applies. Variation of L_3 is also an effective way of changing the inductance of L_4 though in this case reducing the turns on L_3 reduces the inductance of L_4 . In our experience we have found it undesirable to vary the number of turns in L_3 or L_4 with the idea of lining up the two circuits. Slight spacing of one or two of the end turns, however, is often helpful. Strange as it may seem, we found no difficulty in adjusting the two circuits so that they would track across any of the amateur bands. It required only a few minutes of

(Continued on page 90)



BOTTOM UP: ANOTHER VIEW OF THE FOUR-TUBE SET

The untuned r.f. tube socket is at the right, the 'phone jack, volume control resistor and tuning knob being visible below it. Centrally located is the audio tube and the fitting for the battery cable plug. The wiring is relatively simple and carried out with no regard for appearance. Every effort has been made to make the paths through the by-pass condensers to ground as short as possible.

The Important First Choke in High-Voltage Rectifier Circuits

By F. S. Dellenbaugh, Jr., and R. S. Quimby*

A KNOWLEDGE of circuit behavior is all important in experimental engineering. Michael Idvorski Pupin called this "the physical conception" of engineering. More recently, Johnson O'Connor of the General Electric Company has defined it as "space visualization." In any event it is almost imperative to know, feel or imagine what is going to happen in a given set of circumstances. Theory is invaluable as a guide but is based upon prior observation, while experimental work is the proof of the engineering pudding. Guglielmo Marconi, whose thirtieth anniversary of transatlantic radio is being celebrated even as this is written, succeeded because he tried to see what would happen even though Hertz had shown that radio waves travel in straight lines and theoretically would not follow the curvature of the earth.

In straight a.c. and d.c. circuits, under conditions of continuous current flow, space visualization is not difficult and comes unconsciously to successful experimenters. It seems perfect common sense, for example, to visualize that if the voltage is increased, the current will increase. Meters put in the circuit give consistent readings and their meaning is usually clear. We know that a d.c. meter will not measure a.c. and that most a.c. meters will operate in either an a.c. or d.c. circuit. But very few people mentally connect up the fact that a meter is merely indicating some sort of average of instantaneous values. As long as the wave shape is normal, as it is in substantially all power circuits, the meter readings behave; meters in series give similar readings even if dissimilar in type and the ordinary laws of power, current, voltage and impedance relations hold good.

PECULIARITIES OF RECTIFIER CIRCUITS

When dealing with circuits containing rectified a.c., however, the situation is very different. At first glance various meter readings appear to be inconsistent. The circuit is not subject to ordinary mathematical analysis due to the discon-

* President and Engineer, respectively, Delta Mfg. Co., Cambridge, Mass.

tinuous action of the rectifier itself. The current never reaches the same continuous flow as in the usual power circuits, since the alternate opening and closing of the circuit through the rectifiers renders the final current as a summation of successive transients. It is difficult at best to visualize transient phenomena and when complicated by rectifiers, which may conduct or shut off at any point in the cycle as a result of the transient voltages set up by the various

circuit elements, a mental picture of what is happening is well nigh impossible. The only way to get around this difficulty is to play with various simple circuits, building up step by step the practical combinations required, and to observe all the events taking place by means of special tools such as an oscillograph to show wave shape, stroboscopic devices to study particular portions of cyclic operation and many accurately calibrated meters.

Unfortunately such tools are not usually available to the amateur and exist largely in the laboratories of scientific institutes and manufacturers. The scientific institute in turn experiments from the academic point of view, usually involving somewhat abstruse and mathematical theory in their pursuits. This is in no way derogatory to these institutions; it is very valuable work of a pioneering nature, but usually is not available, or else is incomprehensible, to most amateurs. It appears, therefore, to be the duty of the manufacturer with adequate equipment of this nature to interpret researches along new lines so that they will be useful to the amateur, as well as to manufacture apparatus that will fit advantageously into such circuits and devices as advances in the art produce.

The recent rapid increase in the use of high-voltage rectifiers, such as the Type '66 and similar tubes, has introduced the necessity of so designing circuits that they will not only produce the desired d.c. voltage with low ripple but will also protect the rectifier tube as well. This type of tube is limited by peak current and peak inverse voltage. Ordinary meter readings indicate some sort of a "funny" average and nobody

Dr. Dellenbaugh's name has been closely identified in amateur circles with the design of electrical filters from the time of QST's publication of his classics on filter design back in 1923. Their popularity demanded reprinting in abstract form; and the tabulated data for filter design that appear in *The Radio Amateur's Handbook* to this day have been inherited from them. It is with real pleasure, therefore, that QST presents this article as the first of a series by the same Dr. Dellenbaugh, in collaboration with Mr. Quimby, treating the filter problems peculiar to modern rectifiers. — EDITOR.

can guess what the peak current is from the reading of one meter. For the sake of the meticulous minded it might be added that peak values do bear a definite relation to meter readings for *uniform and known wave shape*. The whole theory of a.c. is built on this basis. But a knowledge of wave shape is imperative. The usual relations assume it to be known and from this we derive relations and factors which we assume to be facts. When wave shape becomes erratic, as in rectifier operation, a detailed oscillographic study is necessary for interpretation.

It has become common knowledge, among those interested, that a choke must precede the first condenser in the filter circuit used with such high-voltage rectifiers.¹ This choke is required to reduce the current peaks. This much quali-

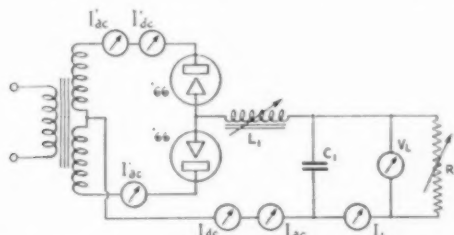


FIG. 1.—TEST CIRCUIT WITH INCOMPLETE FILTER

tative information is available. But further questions are: How much does such a choke reduce the peaks, what size has it got to be, how are we going to know whether the tube is operating within safe limits or not? In other words, to properly design the circuit for the best use of materials, for maximum output safely allowable and for the least cost, quantitative information is required. With all due respect to other authors on the same subject, this point of design seems to be still rather hazy and full of compromises. It is the purpose of this article to show that the inductance of the first choke has a very definite critical value, depending upon the load resistance only, and to describe several tests illustrating what happens when the inductance of the first choke is varied.

THE SET-UP FOR THE TESTS

The purpose of the circuit elements of a smoothing filter is to store up energy during voltage peaks and deliver it during voltage valleys. The inductance elements store this energy in the form of electric inertia by means of their magnetic field. The condenser elements store energy in the form of electric elasticity in their voltage fields. Therefore we are dealing with electric weights

¹ Pike and Maser, "A New Type of Rectifier Tube," *QST*, Feb., 1929; Maser and Saxton, "Mercury-Vapor Rectifier Ratings and Circuits," *QST*, March, 1931. — EDITOR.

and springs, a definite analogy frequently of use in visualizing circuit behavior. It is known that as the first inductance is made greater the peak current becomes less. A guess can therefore be made that there must be some relation between the first inductance element and the constant

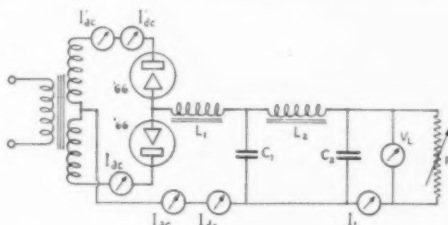


FIG. 2.—TEST CIRCUIT WITH COMPLETE FILTER

energy being withdrawn through the load. At the risk of criticism for being mathematical, we may state that:

Storage of energy in choke = $\frac{LI^2}{2}$ in watt-seconds (Joules)

Dissipation of energy in load = I^2R in watts

Where, L =henrys, I =amperes, R =ohms

For any given frequency with a single-phase rectifier, energy must be stored to carry the I^2R output for some portion of a half cycle. Doesn't it seem reasonable, since both the energy storage

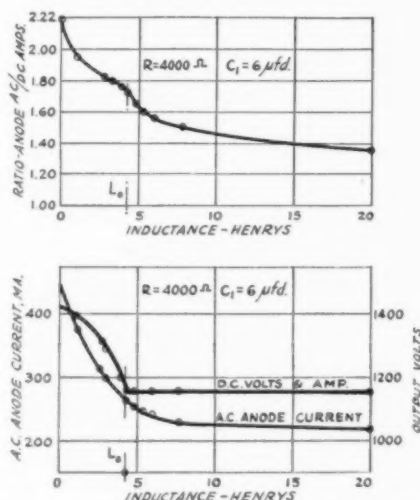


FIG. 3 — CURRENT AND VOLTAGE RELATIONS AS FIRST CHOKES IS VARIED

in the choke and the energy dissipation in the load are proportional to I^2 , that there must be some relation between the values of L and R that will materially affect the circuit operation?

In order to investigate this, five tests were

made. In such investigations it is important to vary *only one independent element at a time*. Otherwise the results become obscure and the observations difficult to interpret. There are also critical conditions that must be avoided, in this case, particularly, resonance. With 60-cycle power the output of a full-wave single-phase rectifier has a fundamental frequency of 120 cycles. There may be some 60 cycles present if the tubes are unbalanced but usually it is negligible. Some values of inductance and capacity resonating at 120 cycles are given below. It is a good plan to memorize any pair of these values for better mental image. Resonant conditions will then be unconsciously avoided in carrying out rectifier tests.

TABLE I
Values of L and C resonating to 120 cycles
Resonance is given by the well known formula: $f = \frac{1}{2\pi\sqrt{LC}}$

Inductance Henrys	Capacity Microfarads
0.5	3.5
1.0	1.75
1.5	1.17
2.0	0.875
4.0	0.438
6.0	0.292
8.0	0.218
10.0	0.175
20.0	0.088

Note that a 6-henry choke would be far below resonance with a 1- μ fd. condenser, a frequently used combination. But if the choke loses inductance due to d.c. saturation, a common occurrence, it might drop to 2 henrys or less, a not unheard of event, in which case resonance would be closely approached and disturbance of the filter circuit operation would be expected.

The test circuits are shown in Figs. 1 and 2. They are the usual type of rectifier circuit for this purpose and do not require detailed description. Fig. 1 was used for the first tests to eliminate complications of following filter sections. Fig. 2 was then used to prove that added filter sections did not affect the fundamental relations. Both a.c. and d.c. meters were used in the anode and rectifier output circuits. These meters read differently and the ratio of their readings is very significant of circuit operation and wave shape. A single meter was placed in the second

anode circuit merely to check balance of the two rectifiers. The meters in the load circuit were d.c. only, since the smoothing was adequate to make the a.c. and d.c. readings substantially identical. In each test observations were made of all meter readings but only those giving significant data are reproduced herewith in the form of curves. The details of test procedure were as follows:
(Note: Table II.)

QUALIFICATIONS OF TEST OPERATION

Test No. 1 (Results shown in Fig. 3)

Readings were taken for successive values of L_1 and plotted as shown. The critical value of L_1 is indicated by a sudden rise in terminal voltage as the inductance is reduced. It is also indicated by the ratio of a.c. to d.c. anode current becoming about 1.75. This ratio is changing rapidly at this point.

Test No. 2 (Results shown in Fig. 4)

The main variable was the load resistance R . For each value of R the inductance L_1 was varied until the critical value was found, the critical point being determined as described under Test No. 1.

Test No. 3 (Results shown in Fig. 5)

The first condenser was varied alone, all other elements being held at fixed values.

Test No. 4. (Results shown in Fig. 6)

This duplicated the procedure followed in Test No. 2, the only difference being the added filter section as shown in Fig. 2.

Test No. 5 (Results shown in Fig. 7)

This duplicated the procedure followed in Test No. 3, except that filter section was added. The two condensers were varied simultaneously, C_1 always being twice C_2 . This arrangement is a little different from common practice, but was followed advisedly from theoretical reasons which will not be elaborated here. It does not affect the conclusions as to critical inductance in any way.

THE CRITICAL AND OPTIMUM VALUES OF THE FIRST CHOKE

The tests show that there is a critical value of the first inductance. Fig. 3 shows that the anode direct current and the load voltage reach a constant value when the first choke is increased to its

TABLE II
Test procedure for determining the critical value of L_1
Other circuit elements

Test No.	Variable Element		L_1	L_2	C_1	C_2	R Ohms	Object
1. Fig. 1.....	L_1	Var.	0.....	0.....	6 μ fd.....	0.....	4000.....	To find critical value of L_1 for fixed circuit.
2. Fig. 1.....	R & L_1	Var.	0.....	0.....	6 μ fd.....	0.....	4000.....	Crit. L_1 as affected by variations in load R .
3. Fig. 1.....	C_1	Var.	6.84H.....	0.....	Var.....	0.....	4000.....	Crit. L_1 as affected by size of first condenser.
4. Fig. 2.....	L_1 & R	Var.	12H.....	4 μ fd.....	2 μ fd.....	4000.....	4000.....	Crit. L_1 as affected by added filter section.
5. Fig. 2.....	C_1 & C_2	Var.	6.3H.....	12H.....	Var.....	Var.....	4000.....	Resonance effects with added filter section.

critical value. For larger values of inductance at L_1 the d.c. output remains constant. Although the anode direct current remains constant after the critical value of L_1 is reached, the a.c. value continues to decrease fairly rapidly until the first choke has twice the critical value, when further change occurs slowly. This value of twice the critical inductance may be called the "optimum inductance" and appears to be the value that should be used in filter design.

The value of critical inductance, which we will call L_0 , is directly proportional to the load resistance — and nothing else (for a given frequency). This is shown by Fig. 4. The actual relationship is very simple:²

$$L_0 = \frac{R}{1000}$$

L_0 in henrys
 R in ohms

The value of L_0 might also be affected by:

1. The values of filter condensers
2. Added filter sections
3. Rectified voltage
4. Frequency
5. Tube characteristics

The effect of condensers is shown in Figs. 5 and 7. As long as the condensers are large enough to avoid resonance, any increase in size has no effect on L_0 . The circuit resonant point must be about one half or less of the impressed frequency, (one half or less of 120 cycles with full-wave single-phase 60-cycle rectifier). In the circuit of Fig. 1 the resonant point is the same as for a regular series resonant circuit and is given by the formula attached to Table I. When a filter circuit is added the system becomes a parallel resonant circuit coupled to the tube by the first choke and shunted by the load. In this case the resonant point becomes the cut-off frequency of the filter circuit.

The value of L_0 is independent of voltage. This is not shown in detail, but is implied by the checks at very low voltages mentioned in Footnote 2. The circuit of Fig. 1 was also tried out with transformer voltages from 960 to 2,720, the load voltages (d.c.) resulting from this input ranging from 435 to 1065. With a constant load of 2000 ohms this gave load currents running from about 200 to 550 ma. The critical value of inductance was the same in each case, being equal to $R/1000$ within 5%.

It was not possible to try out variable frequency. As the function of the choke is to supply energy between cycle peaks, the critical value should be inversely proportional to fre-

quency. More intricate theoretical examination gives the same result, and any readers having 50 cycles, for example, should multiply values of L_0 from these test results by 6/5 to obtain the same operation.

Tube characteristics in general do not materially affect the value of L_0 . So far it has been assumed that L_0 depends upon load resistance only. Strictly speaking, the total resistance in the circuit should be included, and this involves tube

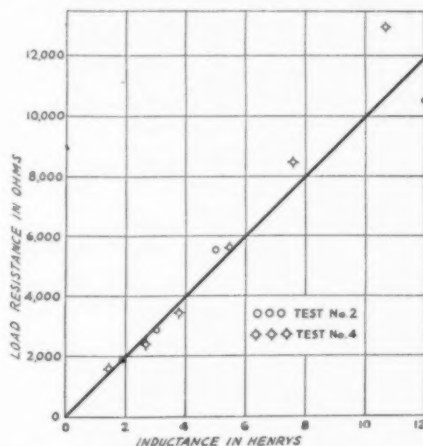


FIG. 4.—RELATION OF CRITICAL INDUCTANCE TO LOAD RESISTANCE

drop. Therefore if the rectifier tube resistance becomes an appreciable part of the whole circuit, it must be included in the value of R controlling the size of L_0 . Where a tube has a definite start-

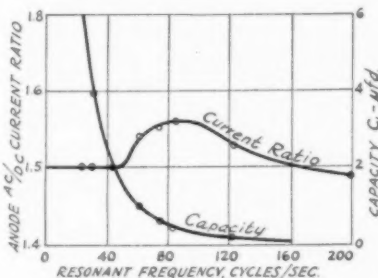


FIG. 5.—EFFECT OF RESONANCE ON ANODE CURRENT, INCOMPLETE FILTER

ing voltage, seldom serious in commercial forms at present available, the critical value must be larger. There is no simple way of expressing this increase. Experiments with a rectifier tube where the starting voltage was about 20% of the (d.c.) load voltage increased L_0 by about 10%, so tube characteristics can in general be neglected within the limits of customary engineering error.

²This same relationship holds for a wide diversity of rectifiers. It has been checked with a 12-volt 2-ampere copper-oxide rectifier, as well as an experimental tube type delivering 30 volts and 5 amperes. The same results were obtained with minor variations due to difference in tube characteristics.

EFFECT OF CRITICAL INDUCTANCE UPON CIRCUIT BEHAVIOR

The first choke, when properly chosen, not only reduces peak values of current, thus safeguarding the rectifier tube, but also improves several other operating features.

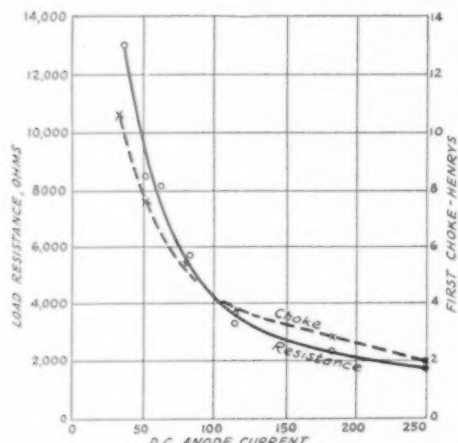


FIG. 6.—CRITICAL INDUCTANCE AS A FUNCTION OF LOAD RESISTANCE WITH COMPLETE FILTER CIRCUIT

See Fig. 4 for ratio of curves.

When the first choke equals the optimum value, the current wave through the anode of the rectifier is almost rectangular or flat-topped. Under these conditions the peak value of anode current is almost the same as the d.c. load current delivered (say 5 to 10% higher) and it is possible to run safely such a rectifier at a d.c. output current substantially equal to the peak current rating of the tube.

The voltage regulation of the rectifier is much improved.³ When L_1 is less than L_0 , light loads allow the output voltage to approach the peak value of the a.c. impressed voltage due to condenser storage. Heavier loads, meaning less load resistance, drag the voltage down to the average value of impressed a.c. If L_1 exceeds L_0 for all loads, the output voltage is always the average of the impressed a.c. (less resistance drops in the filter circuit) as shown in Fig. 3. The objection may be raised that this lowers the available d.c. voltage. As a matter of fact, it should be considered that the d.c. voltage at full load will be substantially the same as with other circuits and the improved regulation will prevent this voltage from rising to dangerous values at no load. There is also the additional point that more

³ c.f. Ed. Glaser, "Improving Voltage Regulation of Rectifier-Filter Systems," *QST*, October, 1931. Mr. Glaser has pointed out the desirability of varying inductance in the first choke. Measurements of L_1 in his circuit would make an interesting comparison with the definite values of L_0 found above.

power can be drawn from the rectifier due to reduction of peak current to substantially the minimum possible.

The reduction of the alternating current in the anode circuit promotes economy in material. The power output of the rectifier is proportional to the anode direct current. The heating of the transformer secondary is proportional to the square of the alternating anode current. Thus by the use of a first choke of optimum inductance it is possible to reduce the size of the transformer secondary wire, or to make a hot transformer run cool.

A first choke of critical or optimum value will materially aid in ripple smoothing, provided resonant effects are avoided. This improvement in smoothing and reducing material in the transformer will compensate in cost for any increase in size of first choke.

DESIGN OF THE FIRST CHOKE

The rectifier circuit will operate between two load limits:

1. Full load output, minimum load resistance R .
2. No load output, load resistance = bleeder circuit.

At full load L_1 should be the optimum value of twice L_0 in order to reduce heating currents to a minimum. At no load L_1 should have a value of at least L_0 to prevent undue rise in voltage, impairing regulation and endangering the rectifier, condensers and associated equipment. For example:

Assume a rectifier to deliver about 300 milliamperes at 1000 volts.

The load resistance at full load is 3000 ohms.⁴

With 50 ma. bleeder current the no-load R is 20,000 ohms (approx.).

Optimum inductance at full load is 6 henrys.

Critical inductance at no load is 20 henrys.

A 20-henry constant inductance choke becomes rather large, but advantage can be taken of the tendency of iron-cored chokes to slide around in inductance with changes of d.c. and a smaller air gap can be used. It is, however, imperative that the choke be properly designed so that saturation does not pull the inductance down too far at full load.

Such a choke might be made approximately as follows:

Rating

7-henry 400-ma., storage 0.56 watt-seconds (to allow for bleeder current, etc.)

20-henry 50-ma., storage 0.025 watt-seconds

Core

Cross section: $1\frac{3}{4}$ " wide, laminations stacked 3" thick; gross area 5.25 sq. in., net area 4.75 sq. in.

Window: $2\frac{1}{2}$ " long by 2" wide, area 4.5 sq. in.

⁴ The effective load resistance is equal to the output voltage divided by the load current. — EDITOR.

Winding

Coils: Two (2), one each leg, $2\frac{1}{2}$ " layer, 1" depth,

Core form, $1\frac{1}{8} \times 3\frac{1}{8}$ ins.

Wire size, No. 24 B & S (400 milliamperes)

No. turns, 1500 each coil. 3000 total.

Mounting: Assemble core in four legs.

Assemble coils on longer legs.

Mount with clamps and butt joints in core.

Air Gap: Make two corners butt steel to steel.

Put spacers in other two corners.

Total thickness of all spacers .020 in.

Material

Core steel should be 4% silicon transformer steel.

If ordinary dynamo steel used, increase core area 20%.

Space is figured for single-cotton-enamel covered wire.

Use brass or wood core clamps. Do not use iron, because of high a.c. component in leakage field around gap.

Tests

The best way to test is to adjust gap at full load and no load conditions for best results.

If tested on 110 volts 60 cycle a.c. the choke should draw 8 millamps, showing an inductance under these conditions of 30 henrys.

Accuracy

The correctness of this design cannot be guaranteed since the actual inductance varies so much with type of steel, care in shearing and assembly, amount of a.c. component present and parts used in rest of circuit. It is

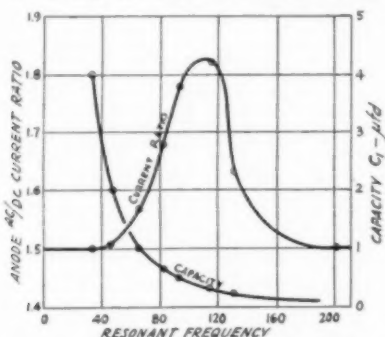


FIG. 7.—EFFECT OF RESONANCE ON ANODE CURRENT, COMPLETE FILTER

generous in design and should prove satisfactory in the majority of cases. It will probably carry 500 ma. without overheating.

TESTING FOR BEST FIRST CHOKE

The simplest method of determining whether the first choke is properly limiting the peak value of current is to use an a.c. and a d.c. meter in series in the anode circuit. The ratio of a.c. to

d.c. readings should be 1.75 at $L_1 = L_0$ and 1.5 when optimum L_1 is used. These same tests can be made with bridge-connected rectifiers. In this case the meters still must be put in the anode circuit of one tube and not in the transformer secondary lead.

In the meter test some precautions are required. The calibrations of the meters should be checked on d.c. and readings compared. They need not have absolute accuracy, but one should be corrected with respect to the other. Do not take reversed readings on the a.c. meter but leave it connected with the same polarity so that d.c. from the rectifier will flow through it in same direction as was used in calibration. This is important because some a.c. meters read slightly different for reversed d.c. Meters using rectifiers are not satisfactory for this purpose. The d.c. meter should be of the D'Arsonval type, such as Weston 301, and the a.c. meter should be of the dynamometer, iron-vane or thermocouple type, so that it reads true heating value (effective current).

SUMMARY

1. The first choke in a high voltage rectifier circuit has a critical value.
2. The henrys for critical value is load resistance divided by 1000.
3. The optimum value for full load operation is twice the critical value.
4. The critical value is independent of everything except load resistance (or, more accurately, total circuit resistance) and frequency.
5. Resonance with rectifier output frequency must be avoided.
6. A first choke of optimum value will:
 - A. Limit current peak to substantially a same value as d.c. output.
 - B. Improve smoothing of filter.
 - C. Greatly improve regulation of voltage.
 - D. Materially reduce heating of transformer secondary winding.
7. These optimum conditions can be tested for by means of the a.c. to d.c. current ratio in the tube anode circuit.
8. The inherent choke characteristics of varying inductance with direct current are advantageous to make critical inductance follow changes in load.
9. The size of choke required for optimum value is reasonable and approximates customary practice. However, it cannot be allowed to fall off too far, as load increases, due to saturation or poor design.

Strays

There's still another ham with the initials H.A.M. He is H. A. Morris (the same as W4KZ, curiously enough), W4LC, of Obion, Tenn. That makes three of them now, G6WY having started this business.

The 'Phone Bands Are Modified

Effective April 1st, 'Phones Get 100-kc. Sub-Band 3900-4000, But Special Operator Examination Necessary—Other Changes

By K. B. Warner, Secretary, A.R.R.L.

GOOD news for 'phone men: On December 17th the Federal Radio Commission adopted the American Radio Relay League proposal for a modification of the regulations establishing the sub-bands open to radiotelephone operation as was reported in July *QST*, pp. 29-30.¹ Effective April 1st the "80-meter" 'phone band is widened to 100 kc. and moved to the other end of the band, from 3900 to 4000 kc. (75 to 76.9 meters). The "20-meter" 'phone band is narrowed up to the central quarter of that band, the hundred kilocycles from 14,150 to 14,250 kc. Both of these bands are to be open only to operators who are certified by the Department of Commerce (that is, by the supervisors of radio) for unlimited amateur 'phone work. After April 1st only the high-frequency half of the "160-meter" band is open to 'phone, being from 1875 to 2000 kc. (150 to 160 meters), but both this portion and the entire "5-meter" band are available to any amateur for 'phone operation without more ado. Until April 1st the 'phone bands remain exactly as they have been the past several years.

Last month we published the complete text of new amateur regulations to become effective February 1st (p. 36, January *QST*), being a series of paragraphs numbered from 361 to 387. The Commission sent us this for publication, as it was believed to be in final form. When the 'phone amendments were to be made, however, it was found that the most convenient way of accomplishing it was to modify the text of the revised amateur regulations, and fortunately it was possible to catch the government printer's proofs and make the changes at the last minute. The regulations as we published them in January, then, are not correct in the two paragraphs dealing with telephony and numbered 376 and 377. The 'phone amendments were made by changing these two paragraphs to read as follows:

"376. The following bands of frequencies are allocated for use by amateur stations using radiotelephony, type A-3 emission:

- (a) Until 3 o'clock a.m., E.S.T., April 1, 1932:
 - 1,715 to 2,000 kilocycles
 - 3,500 to 3,550 kilocycles
 - 56,000 to 60,000 kilocycles

- (b) Effective after 3 o'clock a.m., E.S.T., April 1, 1932:

1,875 to 2,000 kilocycles
56,000 to 60,000 kilocycles

"377. Provided the station shall be operated by a person who holds an operator's license of a grade approved by the Secretary of Commerce for unlimited amateur radiotelephone operation, amateur radio stations may use radiotelephony, type A-3 emission, in the following additional bands of frequencies:

- (a) Until 3 o'clock a.m., E.S.T., April 1, 1932:
 - 14,100 to 14,300 kilocycles
- (b) Effective after 3 o'clock a.m., E.S.T., April 1, 1932:
 - 3,900 to 4,000 kilocycles
 - 14,150 to 14,250 kilocycles"

Thus the regulations now specify two sets of frequencies: first, those effective February 1st when the new regulations take effect, and representing no change from our present practice; second, new sub-bands that become effective April 1st. And each in turn is subdivided between the frequencies open to any amateur and those open only to the specially-qualified. One other important change, effective April 1st, is to be noted. In the past an operator, even though qualified, was not permitted to operate "20-meter 'phone" until he made application for and had his station license amended to that effect. That language is now dropped and no endorsement upon station license will be necessary after April 1st for 'phone work in either the 3900-4000 or 14,150-14,250 bands provided the operator has properly qualified.

OPERATOR QUALIFICATIONS

Let us now examine this business of an operator qualifying for "unlimited amateur radiotelephone operation." "Eighty-meter 'phone" has been terribly congested. There are two ways to improve conditions: to widen the band or to reduce the number of stations. The band has been widened to 100 kc. but with the great number of 'phones this will not cure the trouble. This 3900-4000 'phone band is still narrow and crowded, but it is all that can be spared. It is therefore precious. If it is not big enough to accommodate everybody, it would be well to regard it as a kind of special privilege for more advanced work and to protect it from those whose inexperience or lack of serious interest would spoil it for everybody—and provide another

¹ See also this month's editorial.

less-restricted place for the latter in a band where space is not at such an awful premium. Exactly that arrangement is provided by the new regulations. It is an arrangement that has been earnestly sought by the 'phone hams themselves and will meet, we feel sure, with universal approval. Briefly the idea is that no amateur may operate 'phone on "80" or "20" after April 1st until he proves to the Department of Commerce, via his district supervisor, that he has

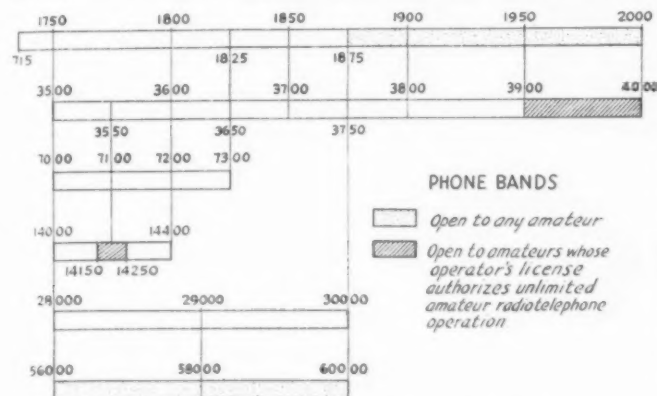
operator's classes) for not less than twelve months; and (2), in addition thereto, passing, with satisfactory grade, a special auxiliary written examination upon matters relating to amateur radiotelephone technique. We expect that those who thus qualify will receive an endorsement on their operator's licenses certifying that they have been examined and are approved for the unlimited operation. We expect that the examination will be somewhat more "technical" than the average

amateur examination, since its purpose is to prove a superior degree of technical ability, but that it will still be of amateur caliber. It should deal exclusively with 'phone matters, such things as circuits and their adjustment, frequency modulation and its cure, percentage of modulation, distortion and its cures, harmonics and their suppression, the functions of buffer amplifiers, and so on — subjects on which there has been a wealth of material in *QST* and the *Handbook*.

Now it can be seen why the new bands cannot be opened until the first of April — time

must be provided for 'phone amateurs to qualify under the new examination, time must be given the Department of Commerce and the supervisors to set up their regulations and get ready. We expect that they will be all set by early February — watch for a broadcast on it. February 1st is a particularly desirable date for the inauguration of examining arrangements because on that date the "20-meter" 'phone operation previously authorized by the Commission expires and is thereafter to be permitted only under a Commerce unlimited authorization. This is pretty complicated, but let's get it: New F.R.C. regs say that, effective February 1st, operation in the present "20-meter" 'phone assignment is permissible only to those so authorized by Commerce. We have recommended to Commerce that those amateur operators who secured the privilege from the Commission on a basis of showing technical qualifications, have their operator licenses now endorsed upon application and without reexamination; but that, if the present authority is simply the holding of an extra first class amateur operator's license or higher grade, the applicant, having demonstrated no special radiophone knowledge, should be obliged to prove his ability by successfully passing the new examination — the same examination which, after April 1st, will be necessary for the new "20" and "80" 'phone work.

Now let's summarize: About February 1st the Radio Division will announce how an amateur



THE NEW 'PHONE BANDS EFFECTIVE APRIL 1, 1932

special experience and qualifications to warrant the Department in certifying him for unlimited 'phone work, that is, for operating 'phone in every band open for 'phone. In that way the precious 3900-4000 allocation is confined to the serious and better-qualified workers, and protected against the c.w. man who is struck by the sudden impulse to mess about with loop modulation or kindred abortions and the equally devilish machinations of the inexperienced purely-'phone operator.

Based on the plan formulated by the A.R.R.L. Board of Directors, the League has made recommendations to the Radio Division, Department of Commerce, for a program of certifying operators which will complete the arrangement set up by the Federal Radio Commission in Regulation 377. At the time of writing this article the Radio Division has not announced its decision or any of the details which it will inaugurate. We have been encouraged to believe, though, that the A.R.R.L. recommendations will be accepted by the Division, and consequently we sketch here the details of that plan. If there are any changes from them when the announcement is made, the information will be put out in A.R.R.L. Official Broadcasts.

We expect that the qualifications that the Radio Division will set up for obtaining authorization for unlimited 'phone work will consist of (1) having held a license of any class (except limited broadcast and commercial radiotelephone

may qualify for an "unlimited," via his supervisor of radio. There will be two months available to take the examination. Those who qualify will have the right, after April 1st, to operate 'phone in the widened "80-meter" band and in the narrowed "20-meter" band. On April 1st all those who have not received the special certification must cease all 'phone operation anywhere in the 3500-4000 (75-85 meter) band. Amateurs of less than one year's experience will not be eligible for this certification and so, on the face of it, must cease operation in the "80-meter" 'phone band after March 31st. These newcomers in the amateur ranks, and all those who attempt the examination but fail to pass it, may continue their 'phone work in the lower-frequency band, 1875-2000 kc. (150 to 160 meters). When the year of apprenticeship is up, or when the unsuccessful applicant has boned up on his 'phone technique a bit, another try will be in order for the "unlimited" which unlocks the special privileges of the special bands. The lower-frequency band, by the way, is a dandy, and is appreciated only by a few wise men who are having a whale of a good time down there more or less by themselves.

THE NEW BANDS

Our chart gives a graphical representation of the harmonic relationships between the new 'phone bands. The most important thing to note is that the "80-meter band" 'phone allotment, in addition to being widened, is *moved* to the extreme other end of the band—from the 85-meter end to the 75-meter end. It stays at 3500-3550 until April 1st, and on that date it becomes 3900-4000. This involves some readjustment in 'phone stations but not at all of a major nature. A new crystal or a few molecules scraped off the old one, a little wire clipped off the old ether-irritator, a careful retuning. The lads in *QST's* technical department are at work now, by the way, on an article of practical advice on changing over to the new bands, which will be published in our next issue.

Speaking of changing over, this is a good time to clean house and do away with some modulated oscillators. It is bad form to run a 'phone consisting of a modulator which operates directly upon an oscillator. If that oscillator is a self-excited one, the trouble increases to the proportions of an atrocity. The fact that there are still such 'phones on the air moves us to point out that, in addition to being in poor taste and wretched contraptions for telephoning, such gear is in violation of regulations. The regulations require amateur stations to avoid frequency modulation and to arrange their apparatus so that variations in plate voltage cannot affect the frequency of the oscillator. Voice-modulated oscillators do not meet this standard; far from it, they give the worst known example of frequency

modulation. A buffer amplifier, between the oscillator and the tube being modulated, is practically essential to comply with the regulations in present-day amateur telephony.

One reason why the Commission was perfectly willing to make the change in 'phone bands was that amateur 'phones have been causing bad interference with the aviation telephone service on 3460 and 3484 kc. Although some 'phones have been out of bounds, plenty of the trouble was caused by perfectly legal operation on both sides of 3500, because of the impracticability of equipping airplanes with fully-selective receivers. The change to the other end of the band evades that dilemma. It threatens another, however, for on 4015 kc. is the Navy's hot four-point circuit: NAA, NAJ, NAR and NAT. Fortunately this is telegraphy with heterodyne reception and consequent selectivity and there will be no interference if 'phone amateurs stay south of 4000 kc. and avoid frequency modulation. The Navy's 4015-kc. circuit is important, however, and we have been told that interference on that frequency will result in prompt action against the amateur 'phones. NAA's key-clicks and mush, by the way, have disappeared with a recent change in transmitters.

The 'phone assignments are not exclusive to 'phone. No amateur 'phone assignment in this country has ever been exclusive. The reason for that is that the basic grant to an amateur who has learned the code and mastered the regulations as well as learning some of the technique of radio is the right to operate c.w. in the full widths of all the bands. Thereafter comes telephony as a specialty, with its special non-exclusive allocation. This much is chiefly a legal point having to do with the preservation of rights and the conveying of equal basic rights to all amateurs. In practice it has long been observed that a 'phone assignment is practically exclusive in its effect; 'phone interference is too tough for c.w. stations to stand. We urge the continuance of this practice as a matter of justice and common sense. Let the c.w. stations in the "80-meter" band choose frequencies outside of the 3900-4000 band open to 'phones, and while the 'phones are moving into the latter let the c.w. stations there move down in the band.

It will pay us to be orderly in this business of changing over. Lack of caution can easily play hob with our most important band. For instance, we mustn't have 'phones running at both ends of the band at once. Any practicing up for the new band should be done on a dummy antenna; don't worry—it will take only an hour or so to change over. No 'phone operation is permissible on 3900-4000 until April 1st (and then only by those who have qualified). Starting April 1st there is to be no more 'phone operation on 3500-3550 (even by those who did not qualify; their

(Continued on page 90)

Some Appreciated Assistance

Army and Navy Pledge Amateur Support in American Signal Corps Association Demonstration

A VERY pleasing demonstration of friendship and support for the American amateur was recently engineered by the San Francisco Signal Post of the American Signal Corps Association, resulting in the exchange of amateur radiograms between the post and high-ranking Army and Navy officers in which the latter pledged support to the amateur at Madrid. We are indebted to Mr. Sylvester Whitten, secretary-treasurer of the post, for complete particulars. Quoting from his letter:

It is the feeling of the San Francisco Signal Post of the American Signal Corps Association that the radio amateur merits the full support of our Government at the Madrid Conference in 1932. To this end, our regular October meeting was given over to "Amateur Radio Night" and arrangements were made, in line with a motion unanimously passed at the previous meeting, to act in support of the amateur.

It was then determined to send messages via amateur radio to the War and Navy Departments, urging support of the amateur at Madrid and asking these departments to make similar representations to the Department of State. The plans were worked out by Mr. Ralph M. Heintz, W6XBB, of Heintz & Kaufman; Lieut. Chas. L. Watson, Sig. Res., W6DW-W6CLW; and Lieut. (j g) Leroy F. Watson, U.S.N.R., W6BI-W6NK; and provided for the handling of the messages while the meeting was actually in session. To this end, portable station W6CLW was set up in the meeting room and manned by Mr. David H. Atkins, W6VX. Since Lieut. Watson is in charge of the Naval Reserve Amateur Net in that naval district, the amateurs of this net were lined up for the relay and the message went from NDH in San Francisco to NDS in Chicago to NDN in Washington. Here is its text:

CHIEF SIGNAL OFFICER
CHIEF OF NAVAL OPERATIONS
WASHINGTON DC

THE SAN FRANCISCO SIGNAL POST OF THE AMERICAN SIGNAL CORPS ASSOCIATION AT ITS OCTOBER MEETING DEVOTED TO THE SUBJECT OF AMATEUR RADIO RECOGNIZES THE VALUE OF THE AMATEUR IN PROVIDING EMERGENCY COMMUNICATION FACILITIES AND PERSONNEL FOR THE NATIONAL DEFENSE PERIOD IT REQUESTS YOUR CONTINUED ASSISTANCE ON BEHALF OF THE AMATEUR AT THE COMING INTERNATIONAL CONFERENCE AT MADRID AND RESPECTFULLY URGES THAT YOU CONSIDER PRESENTING HIS CASE TO THE STATE DEPARTMENT AND SOLICITING ITS SUPPORT.

J K FAIRCHILD
PRESIDENT

Replies from both officers addressed were received in a short time over the same circuit. That of the Navy read:

J K FAIRCHILD PRESIDENT
SAN FRANCISCO SIGNAL POST
AMERICAN SIGNAL CORPS ASSN
SAN FRANCISCO CALIF

YOUR DISPATCH OF THE SIXTH OF OCTOBER ACKNOWLEDGED WITH THANKS PERIOD THE NAVY FULLY APPRECIATES THE VALUE OF AMATEUR RADIO FROM THE STANDPOINT OF EMERGENCY COMMUNICATION AND NATIONAL DEFENSE PERIOD IT WILL BE PLEASED TO COOPERATE ON BEHALF OF AMATEUR RADIO AT THE COMING INTERNATIONAL CONFERENCE AT MADRID.

W V PRATT
CHIEF OF NAVAL OPERATIONS

The Army's reply, although coming over the same route, was also unexpectedly brought in over the Army-Amateur Radio System in one jump. Capt. Norman Lee Baldwin, "BN" of W3CXM and big boss of the army-ham system, was not to be scooped by a Navy net, so with characteristic enterprise he got on the air with the message at W3CXM and handed it direct to W6PQ, Capt. R. B. Woolverton, alternate net control station at San Francisco, whence it went to Sergeant Souder who had been stationed near a telephone in the hotel where the meeting was in progress. The reply:

J K FAIRCHILD PRESIDENT
SAN FRANCISCO SIGNAL POST
AMERICAN SIGNAL CORPS ASSN
SAN FRANCISCO CALIF

I DESIRE TO ASSURE THE SAN FRANCISCO SIGNAL POST OF THE AMERICAN SIGNAL CORPS ASSOCIATION THAT THE SIGNAL CORPS REALIZES THE NATIONAL IMPORTANCE OF THE AMERICAN RADIO AMATEUR STOP THE 9TH C A ARMY TACTICAL NET OF 151 ACTIVE STATIONS WITH NET CONTROL STATION AT SAN FRANCISCO IS AN OUTSTANDING EXAMPLE OF THE COOPERATION BETWEEN THE AMATEUR AND THE SIGNAL CORPS STOP THE SIGNAL CORPS JOINS THE NAVY IN ASSURING THE AMERICAN AMATEUR OF ITS CONTINUED SUPPORT.

CARR
MAJOR GENERAL
CHIEF SIGNAL OFFICER

The radio amateur is so frequently bedeviled that it is very splendid to be befriended in this positive and unsolicited manner. Grateful, we conveyed a complete account of the affair to the Department of State. Their reply:

(Continued on page 38)

Which Tube for the Crystal Oscillator?

By George Grammer, Assistant Technical Editor

ALTHOUGH much has been written in *QST* about various aspects of crystal control, especially regarding circuits, doubling, amplifier excitation, etc., comparatively little has been said about the merits of different types of tubes as oscillators, probably because we have not been overly critical. Naturally we want to get as much power from the crystal oscillator as we can, because a high oscillator power-output level means more excitation for the next stage and, finally, more power into the antenna from the last stage. At the same time the oscillator power must be obtained without undue heating of the crystal or danger of cracking it. Therefore the oscillator tube which will give the greatest power output with the least strain on the crystal is the most desirable. Certain types of circuits are advantageous in this respect¹ and may be applied

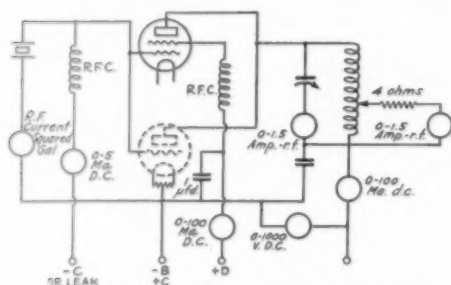


FIG. 1. — THE OSCILLATOR TEST CIRCUIT

irrespective of the type of tube employed, but the present discussion is concerned with the performance of different types of tubes in the same circuit.

Obviously in an investigation of this sort it is necessary to have means for measuring both power output and the power dissipated in the crystal. Power output can be calculated most easily by measuring the current in a circuit of known ohmic resistance and multiplying the current squared by the resistance. Since only comparative measurements are required, it is not necessary to know absolutely the amounts of power developed so long as power ratios can be measured. Therefore, it is unnecessary to know the exact resistance of the load circuit at radio frequencies so long as the resistance does not change appreciably with different currents and is substantially non-inductive. In these tests the load resistor was a small wire-wound affair with a d.c. resistance of 4 ohms. This value of resistance was used as the basis of the power output

calculations, but it is almost certain that the actual power outputs are greater than those shown on the curves because the resistance would be greater at radio frequencies.

Measurement of stress in the crystal is a more difficult problem. Lacking the means of measuring r.f. voltage across the crystal or the temperature change under load, the simplest scheme is that of measuring the r.f. current through the crystal, a method which is not without its shortcomings. The current flowing in the crystal circuit is a measure of the power dissipated in the crystal only so long as the resistance of the crystal is constant; the difficulty is that the resistance of the crystal changes rapidly with frequency, so rapidly, in fact, that a difference of a few cycles in 3500 kilocycles is not small enough to be neglected. Nevertheless this method probably is the most convenient of any, and when used as described later is likely to be a fair test.

The diagram of the test circuit is shown in Fig. 1. The circuit is the conventional one, using a fairly low-*C* tank circuit. The grid circuit was arranged so that bias could be obtained either from a grid leak of suitable value or a tapped "C" bias battery. The test board was fitted up with a four- and five-prong tube socket so that different types of tubes could be inserted, only one socket being used at a time, of course. Measurements were taken of the r.f. current through the crystal, d.c. grid current, r.f. tank current, r.f. load current, d.c. plate current and d.c. plate voltage for each run. In addition, screen voltage and current were measured when necessary. The test procedure was to increase the plate voltage in small steps, taking corresponding readings of the other quantities under maximum load conditions. In addition to reading the crystal current under load conditions for each increment in plate voltage, readings also were taken with the tank circuit detuned to give maximum crystal current with load — the tank condenser setting which gives maximum power output is not the same as that which gives maximum crystal current — and maximum crystal current with the load removed. This last value is always much larger than either of the other two because the feed-back voltage increases when the load is removed. The three readings of crystal current were taken to eliminate, to as great an extent as possible, the difficulties caused by the change in resistance of the crystal with small changes in frequency, the thought being that by covering the entire range over which the crystal would oscillate a general comparison could be made

¹ Lamb, *Crystallizing Crystal Grinding*, *QST*, April, 1930.

between tubes. It is interesting to note, however, that there is less tendency toward heating and cracking when the circuit is adjusted for maximum output than when no power is being delivered by the oscillator — provided there is no feed-back from amplifier stages, which may produce just the opposite effect.

A current-squared galvanometer with a full-scale reading of 115 milliamperes was used for measuring the crystal current. Since the heating of the crystal is proportional to the square of the

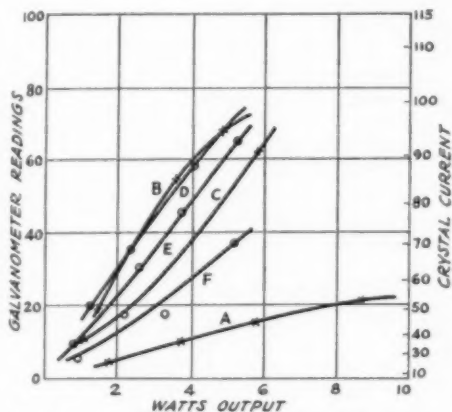


FIG. 2. — POWER OUTPUT — CRYSTAL CURRENT CHARACTERISTICS

The letters refer to the following types of tubes: A, '47; B, '45; C, '10 (transmitting type); D, '10 (receiving type); E, 841; F, '65. The same letters apply in Fig. 3.

current (for a fixed value of crystal resistance) the galvanometer scale readings are more significant than the actual current values, although the latter also are shown. Among the commercial people it is generally assumed that a crystal current of 100 ma. is as much as a 3500-ke. crystal should be asked to carry; therefore the readings under load conditions were taken up to this point only.

The types of tubes tested included the '10, '45, '47, '65 and 841. Several samples of each type, when available, were tested to make sure all tubes of the same type performed similarly. Since the '65 is a screen-grid tube it was necessary to increase the grid-plate capacity to make it oscillate properly in this sort of circuit. This was accomplished by taking two short pieces of insulated wire, connected to control grid and plate respectively, and twisting them together to provide a small condenser. Early in the test it was found that the Type '10 tubes tried were not uniform, and further investigations showed that the Radiotron and Cunningham 210's and DeForest 510's fell into one group and those tubes made for receiver use, such as the DeForest 410 and Eveready 210, into another. The two groups are indicated on the curves.

PERFORMANCE COMPARISONS

In Fig. 2 are plotted the results of the measurements of power output against r.f. crystal current. The curves show that the pentode is far superior to any of the other types of tubes in this respect. For example, with eight watts measured output the galvanometer reading is 20 for the '47 while for the same galvanometer reading the pentode's nearest competitor, the '65, shows an output of only three watts. The "transmitting" Type '10's are next with 2.5 watts, while all the others drop down to 1.5 watts, approximately. On the other hand, at four watts output (about normal for such tubes as the '10 and '45 at 300 volts) the '47 takes a crystal current-squared reading of only 10 against 40 for its nearest triode competitor and up to 60 for the other triodes.

From Fig. 2 we can draw the following conclusions: First, for a given power output there will be much less strain on the crystal when a Type '47 pentode is used than with any other of the commonly-used types; and second, for a given degree of crystal heating much greater power output can be obtained from the '47 than from any of the other types.

It is interesting to note that with the load removed the crystal current was greater than 115 milliamperes for all tubes except the '47 and '65 when the plate voltage was in the neighborhood of 300. This crystal current occurs with something over 400 volts with the pentode and did not

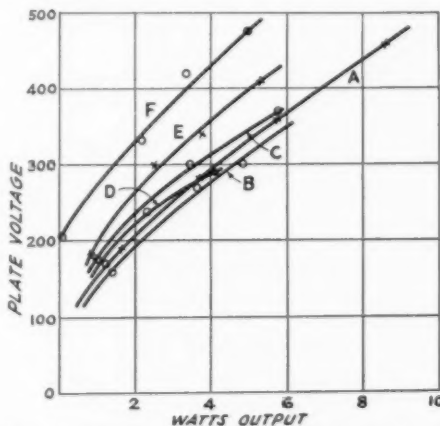


FIG. 3. — POWER OUTPUT AS A FUNCTION OF PLATE VOLTAGE

The 841 and '65, because of their higher plate impedance, do not take as much plate current as the others at the same plate voltage, consequently both input and output are less. The efficiency is approximately the same for all tubes.

occur at all with the '65 on voltages up to 500, the maximum value used in these tests.

Fig. 3 shows how the power output from the

different types of tubes can be expected to vary with plate voltage, without reference to the r.f. crystal current. The '47, '45 and '10 all give about the same power output when the plate voltages are the same. The 841 is not quite so good as the foregoing types, while the '65 is rather poor. These curves give no indication of the efficiency of the

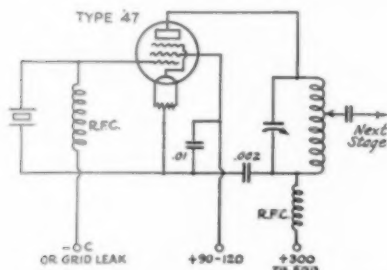


FIG. 4.—PRACTICAL PENTODE CRYSTAL OSCILLATOR CIRCUIT

Circuit values not indicated are normal for other tubes. W9CWI gets his accelerator grid voltage through a dropping resistor of 25,000 to 50,000 ohms connected directly between plate and grid.

tubes, however, since plate voltage only, not plate power, is considered. The 841 and '65 are high-impedance tubes and therefore did not take as much plate current as the others at the same plate voltage, with the result that both input and output were decreased.

It has been known for a long time that more power could be obtained from a tube of low grid-plate capacity with safe crystal currents than from one in which the grid-plate capacity is relatively large. The curves of Fig. 1 bear this out very well, because the tubes which show up best are the '65 and '47, both of which have low grid-plate capacity. A further check on this with a smaller feed-back condenser between grid and plate of the '65 showed, as expected, that higher plate voltages could be used for a given crystal current. In the '65, however, the low grid-plate capacity is combined with a high plate impedance, with the result that for a given power output much higher plate voltage is required than with the '47. The '47, in fact, seems to be an ideal crystal oscillator tube, since it has nearly everything that seems to be desirable — low grid-plate capacity, fairly low plate impedance, and high power sensitivity.

PENTODE OPERATION

The circuit used with the pentode is different from the usual circuit only in that provision must be made for feeding in the voltage for the accelerator grid and for bringing this grid to ground potential for r.f. Fig. 4 shows how the connections are made. Control-grid negative bias may be obtained from either battery or leak. With battery bias 22 volts are plenty for plate voltages up to

500, and if a leak is used its resistance should not be more than about 10,000 ohms. The power output is the same with either method, providing the values are right. Both battery and leak can, in fact, be dispensed with if desired, in which case the control grid is connected to filament through an r.f. choke coil. Better plate efficiency will be obtained with some bias, however. It is advisable to use a grid choke even with leak bias, because the relatively low resistance of the leak may allow a considerable part of the excitation to be wasted in heating the resistor.

In nearly all the uses to which the pentode has been put in r.f. power circuits it has been found that there is little, if any, advantage in putting more than 90 to 120 volts on the accelerator grid. High voltages simply seem to increase the losses without increasing the power output, while lower voltages cut down both plate current and output. This value of voltage is usually not at all critical, however. The accelerator grid current is of the order of 8 to 12 milliamperes. The grid voltage may be supplied through a voltage divider across the power pack or from a separate "B" eliminator or battery.

Since the '47 has a higher plate impedance than the triodes ordinarily used as crystal oscillators, the plate tank circuit should have a rather high L/C ratio for best results. Generally it will be found inadvisable to take off the excitation tap for the next stage directly from the plate end of the inductance. If the following amplifier is a high- μ tube the best place for the tap will be found near the low-potential end of the inductance; for instance when a pentode oscillator is used to excite another pentode the tap will be placed about a third of the distance "up" the coil. It will be nearer the plate end for tubes with lower amplification factors, however. A d.c. milliammeter in the amplifier grid circuit is an excellent indicator of excitation, and the tap should be set so that maximum amplifier d.c. grid current is obtained with the amplifier tank circuit set to resonance.

Other experimenters have reported excellent results using the pentode as a crystal oscillator. A letter from Frank Fullaway, K6CFQ-BUC, which, by the way, inspired this investigation, states that the Geodetic Survey has built and used some small crystal-controlled transmitters using a Type '47 oscillator, keyed and feeding directly into the antenna. Measured outputs of the order of ten watts were secured with 400 volts on the plate, with no crystal heating or creeping. It is possible that later we may have a description of one of these transmitters in QST. A letter from George Collier, W9CWI, received just as this article is going to press, also checks our results as to crystal heating. W9CWI states that the pentode gives approximately four times the second harmonic output obtainable from a

(Continued on page 88)

Rotten Young Squirts

By The Old Man

SAY, you modern Young Squirts! Listen to me.

In bygone years, when amateur radio was young and in the making, it was *Unpopular* to have a rotten fist, send with your feet or send too many CQ's.

It was *Unhealthful*, very, to be outside the regular amateur bands.

It was *Sure Death* to fake a call or send any kind of a false signal.

There were three gadgets that were devised by the amateurs of those early days to keep Young Squirts constantly reminded of these three important don'ts of amateur radio. A Squirt who used too much of what we used to call "Lake Erie Swing," or sent with a slobbery fist, or cluttered up the air with too many CQ's, or garbled his call letters so they had to be guessed at, was called upon by a committee, the chairman of which was a big brute with a positive manner and who exhibited and explained the workings of an instrument known as an *Uggerumph*.

A Squirt who was a band-jumper, or who failed to maintain an intimate acquaintance with a reliable wavemeter, was politely knocked on the head with a base-ball bat, dragged out into the nearest sand lot, and subjected to a surgical operation with a thing called a *Rettysnitch*. The blood of each victim was allowed to dry on this tool. She's all caked up on the business end at this minute. The next time you meet old Fred Schnell ask him how many Squirts he butchered the first year or so after the War, with this *Rettysnitch*. He nearly wore it out. He was Traffic Manager in those days.

Last but by no means least, a Squirt who even thought of using a false call, let alone actually using one, or used profane language on the air or who wilfully broke up other legitimate amateur traffic, was taken for a certain kind of a ride during which an instrument of torture known as a *Wouff-Hong* figured very prominently. No Young Squirt ever returned from one of these "rides." The Wouff-Hong was carefully wiped off after the affair and the rag used to do the wiping was forwarded to me for filing away. There are twenty five bales of these bloody rags in a certain warehouse at the present moment, and recently I have made arrangements to hire some additional space.

Now, I don't want to be unpleasant or to threaten anybody, but by the Great Horn Spoon, you modern Young Squirts, you are riding for a sure fall if you keep on the way some of you are going. The other night I counted one of you send forty-one CQ's and then, to add insult to injury, you ended up with just two miserably-

sent slobbery signs that could not be read by Handy himself.

Now I ask you — why forty-one CQ's if two unreadable calls? What sort of a think-tank do you carry around that led you to sign only twice and rotten at that, if you thought forty-one CQ's were called for? But I must not permit myself to dwell upon your offense for fear this paper will get afire. Just let me say that I've got my eagle eye on you and any moment you may expect to receive a call from my committee, the leader of which will take such steps as may be necessary to convey to you a clear and distinct idea of just what the *Uggerumph* is, what it can do, how it is operated and how it feels.

Another one of you Young Squirts spent the other evening sending V's. You washed out a perfectly good rag chew for me and ditched several words from an important QST from W1MK. And you, you rubber-head who did this, you are going to be hounded down and I'll see that you



are made to eat every V in the dictionary. In the old days we would have boiled you in transformer oil. I reckon you are too young to know what transformer oil is. Well, son — it's *hot*, when it's boiling.

Another one of you thinks it funny to send with your feet instead of your hand. It cannot be done, son, and it isn't funny. It's rotten amateur radio. Nobody can read your stuff, and what's the use of sending if nobody can receive it? If your stuff were to be taken down on a tape receiver it would

bust the machine wide open and hurt somebody. There are only two characters in the telegraphic code. One is a dot and the other is a dash. You seem to think it fashionable to cross-breed the two. It can't be done without getting into trouble and you are in trouble because you are to be located and some dark night you are going to be yanked from your warm little shack and a certain committee will heat up a certain pair of irons and several real distinct dots and dashes will be branded upon that part of your anatomy which will remind you of dots and dashes every time you sit down, for the rest of your life.

I am ashamed to say that three of you are suspected of using some other chap's call letters! On a certain occasion, of which I have record, one of this three had the gawd-awful bad judgment to use a certain Assistant Radio Supervisor's call. (Imagine such a thing, Old Timers!) I don't state what we intend to do with this one. Anyway, the whole bunch of you are slated for the Wouff-Hong, and Lord have mercy on you for nobody else will, especially for the poor unfortunate gargoyle who used the R. S.'s call letters.

It will be my duty to attend to this squad and I have already sent to Hartford for the Wouff-Hong to be forwarded out here by air mail. You enemies of amateur radio will soon be hearing the old pre-war torture chanty, "Fe, Fi, Fo, Fum." A horrible example will be made of you for the benefit of future Young Squirts who are tempted to stray from the straight and narrow. After the committee and I get through with you your bones will be ground up to make breakfast rolls for me and the little wife, and I suspect that Kitty and the kittens will get parts of you.

I have not decided yet what the torture shall be for those miserable whops who splash around in the ether and get afoul of the transatlantic 'phone bands. It's a serious offense. It gets all the rest of us in dutch with the Government and A. T. & T. No precedent exists because we did not use to have transatlantic radio 'phone. This matter is up with the Torture Committee of A.R.R.L. and as soon as something sufficiently blood-curdling can be devised we shall rig up the apparatus and bring you whops in.

I am in favor of stringing all of you up by the thumbs in good old seafaring style, while somebody with a deep voice and slow delivery reads one of Handy's papers on Dynatrons and Methods of Monitoring Frequency, after which all the worn-out and inaccurate wavemeters in your Division will be crammed down your throats.

The idea is to endeavor to make you "frequency conscious." I reckon it will conscious you up all right, especially about the time you feel some of those crooked condenser plates going down.

One of the suggestions the Torture Committee is working on is to have Warner suggest to the forthcoming Madrid Conference the advisability

of compelling all amateurs to eat at least one dynatron before he learns the code. It's a hot idea according to my notion, because if an aspirant for an amateur transmitting license knows what it is to eat a dynatron he will have acquainted



himself with what accurate checking of frequency really means. Any amateur that gags much on a dynatron won't feel much like learning the code for the remainder of his days on earth.

This idea, if put into practice, would choke off the supply of new non-frequency-conscious Young Squirts. We should then have to deal only with the existing Squirts who don't know what accurate frequency means. Gradually we could Wouff-Hong these out of the picture. Then we should be able to live in peace and comfort with the Government and the A. T. & T., a condition devoutly to be desired, if amateur radio is to weather Madrid and if Warner is to retain his reason.

This concludes my warning to you public enemies. It has been a long time since this old barnacle has opened his trap, but after things reached the pass where one of you Young Squirts pinched the Radio Supervisor's call, I had to speak. I am here to see that amateur radio retains its traditions, built in bygone years, when amateurs were loyal, law-respecting and upstanding he-Americans, who were proud of their fists both on the key and in the law-breakers' faces, proud of their procedure, proud of their note, proud of their frequency, proud of their delivered-message percentages and proud of the splendid standing of amateur radio. The Uggerumph, the Retty-snitch and the Wouff-Hong have served in the past, well and terribly. They can serve again.

You present generation of Young Squirts are too young to know the past. It is not recorded. It could not be. But believe me, there was a past. You don't want to have the vengeance of outraged amateur radio wreaked upon you. It's too awful. So — let this old crab's warning be heeded. Remember the traditions of amateur radio when it comes to fists, CQing, V's and using fake calls. Fail not — at your peril!

The F. R. C. Reports on the Amateur

THE Federal Radio Commission reports to Congress. When the present Congress convened, the Commission's fifth annual report was waiting for it. It covers, of course, the whole field of radio in this country. While it is not surprising to find broadcasting occupying much of the picture, all the other services come in for survey. Our principal interest is in the references to amateur radio. In the brief statement conveying the detailed report, the Commission says:

"At the close of the fiscal year there were approximately 22,000 amateur stations in the United States licensed by the commission. The story of the useful and constructive service rendered by amateur stations during the year is most interesting. In addition to many instances of useful service, the long-distance amateur service contributes to the development of data concerning transmission effects on high frequencies. More detailed data concerning this service are set forth in the report of the chief engineer."

The remainder of the report is in sections compiled by the various divisions of the commission. An interesting recital of amateur work, one that we are glad to have laid before the Congress, appears in the report of the engineering division:

There were on June 30, 1931, approximately 22,739 amateur stations licensed. These stations operate on the frequencies allocated for this service by the international radio convention of Washington, 1927, the North American agreement of 1929, and under regulations imposed by the international convention and by General Order 84. Most amateur communications are carried on by radiotelegraph, but there is an increasing interest in radiotelephone transmissions, and portions of the amateur bands have been allocated for use by radiotelephone stations. There has been some activity in the investigation of the ultra-high frequencies above 28,000 kilocycles, but to date there are practically no amateurs consistently communicating on these frequencies, although many experiments are in progress.

A large number of the amateur stations have communicated with similar stations in practically all foreign countries, and such contacts have contributed to development of data concerning transmission effects on high frequencies.

Amateur stations cooperated with the Army, Navy, and Red Cross in handling of emergency traffic and by engaging in mobilization practice in connection therewith. A plan has been worked out by the Navy Department and the American Red Cross for the employment of the Naval Communication Reserve, of which many amateur operators are members, in times of emergency when the Red Cross functions to bring relief to distressed communities. This plan also provides for the use of amateur stations not affiliated with the Naval Reserve. The large number of amateurs that are members of the volunteer Naval Communication Reserve and the Army Amateur Reserve Corps are qualifying themselves for future service in times of national emergencies.

Since 1925 a Navy Day receiving contest has been held for amateur operators, and interest has been continually increasing. On October 27, 1930, a message from the Secretary of the Navy to the radio amateurs of the United States was broadcast by radiotelegraph from the naval radio stations at Arlington, Va., and San Francisco, Calif., and from the

naval reserve station at Hartford, Conn. This message was copied in full by operators of 285 amateur stations.

On March 16, 1931, 494 amateur stations were successful in copying a message from the Red Cross national chairman, which was addressed to all the chapters and representatives of the Red Cross throughout the United States and broadcast by radiotelegraph from the Army amateur net control station in Washington, D. C. Of the 494 amateurs who copied the message, 481 delivered it personally to the local Red Cross representative within 24 hours. The average time interval between the time the message left Washington and the time that the information was received by Red Cross representatives throughout the United States was 2 hours and 25 minutes. Of the operators participating, 338 delivered the messages inside of 18 minutes. This was the first nation-wide mobilization of the amateur radio system for the Red Cross, and resulted in direct contact between these amateur operators and the nation-wide personnel of the American Red Cross, who will require, as they often have in the past, the services of these men to furnish rapid emergency communication in times of disaster when commercial facilities fail.

Immediately upon receiving word of the disastrous earthquake which destroyed the city of Managua, Nicaragua, operators of amateur radio stations throughout the United States, and particularly in Washington, D. C., proceeded to do all in their power to establish communication with the stricken area. From March 31 to April 12, 1931, a large number of messages of a personal nature were handled which could not be routed through Government or commercial stations, since those stations were overtaxed with official traffic.

Amateur operators also have maintained communication between various expeditions and their sponsors in the United States. Among these were the expedition to Africa which made motion pictures in connection with the production of "Trader Horn," the All-American Malaysia expedition to Dutch Borneo, the first international highway exploring expedition in Mexico, the MacMillan Arctic expedition, and the Byrd Antarctic expedition.

Many of the amateur stations participated in competitive activities, arranged by their own organization. Some of these were as follows: 276 stations engaging in a message-handling contest resulted in the winning station exchanging messages with 305 amateur stations distributed throughout the United States and Canada (February 14 to 28). A radiophone versus radiotelegraph transcontinental relay contest, held on January 11, 18, and 25, resulted in the transmitting of a radiotelegraph message from the east to the west coast and the receipt of a reply in two minutes. An international relay contest, conducted from March 8 to 21, inclusive, culminated in 160 American amateur stations communicating with foreign amateur stations in five continents.

The amateurs as a class are continually endeavoring to improve their skill as operators and to so organize their activities that they will contribute to the development of the radio art, particularly in the study of high-frequency transmissions, and at the same time to equip themselves to render the maximum service to the United States in times of emergency.

Strays

John Worisek, of Milwaukee, Wis., suggests that a nifty-looking microphone case can be made from one of those small electric clocks. Remove the works and insert the microphone. The cases are usually fixed up with rubber feet, which helps absorb vibration.

Armistice Day Message, 1931

THE third annual Armistice Day message from the Chief Signal Officer, U. S. Army, to members of the Army Amateur Radio System and all other radio amateurs was transmitted from WLM (6990 kc.) and W3CXM (3950 kc.) on Monday night, November 9, 1931.

This message, broadcast every hour, on the hour, from 6:00 p.m. until 2:00 a.m. (Tuesday) E.S.T., was copied and mailed to the C.S.O. by 542 licensed amateurs. Ninety-two percent of this number were members of the A.A.R.S.

The Armistice Day message to amateurs was inaugurated in 1929, and the results of the three years' activities including 1931 are as follows: In 1929, 125 amateurs mailed in copies; in 1930, 234 mailed in copies; and in 1931, 542 received the message and sent in copies. A significant fact concerning these figures is that in 1931 the total number of active A.A.R.S. stations was approximately the same as in 1930.

The nine A.A.R.S. Corps Area organizations were in competition relative to the reception of the message. The two points to be considered were (1) the percentage of active A.A.R.S. stations who copied and mailed in the message, and (2) the accuracy of reception. The leaders under the first point were the First Corps Area (C. C. Rodimon, WISZ, WLE, Radio Aide), Second Corps Area (Capt. David Talley, ORC, W2PF, Radio Aide), and Fifth Corps Area (L. G. Windom, WLH-WSGZ, Radio Aide). The leaders in percentage of accuracy, point two, were the Third Corps Area (George Kimmel, W3CXX, Radio Aide), Fifth Corps Area, and Eighth Corps Area (Capt. Harry Reichelderfer, Signal Corps, Liaison Officer). The standings in percentage of each Corps Area in order of high rating are

shown in the table at the bottom of this page.

The text of the 1931 Armistice Day message follows:

TO ALL ARMY AMATEURS:

In memory of our comrades who gave their lives to preserve our national integrity I am sending this greeting to each member of our nationwide Army Amateur System as a reminder that this extensive system is designed for the purpose of mitigating further sacrifice of lives in any national or local disaster that may arise. This system is of inestimable value to the nation and to communities and I congratulate each of you for your loyal and untiring effort, your self sacrifice and patriotic devotion that has made our system the efficient organization that it is today. I urge you to continued effort to increase our efficiency for national safety.

CARR, Major General,
Chief Signal Officer.



THE WINNER OF OUR STATION-DESCRIPTION CONTEST THIS MONTH IS . . .

No, excuse us, that's the wrong opening sentence. We'll start again.

Here, folks, is a picture of what we believe to have been the United States Army's first "wireless" station, away back in 1901. The station was located at Fort Myer, Va., and its task was to communicate with Washington, two or three miles away across the river. It never did it, which was pretty good performance for those days. The gear was little short of superb—well, just a little. Featured prominently is one of Mr. Rhumkorff's induction coils, complete with genuine 10-cycle vibrator interrupter. Assorted Leyden jars and a brass-halved spark gap seem to have completed the transmitter. The receiver, one judges, consisted mostly of different kinds of detectors and a pair of 'phones. Neither transmitter nor receiver seems to have bothered much about tuning inductances; perhaps there was enough inductance in the stray wiring.

This station was in charge of Lieut. Alfred Clifton. The operators are First Class Sergeants Kehoe (with 'phones) and Chandler, complete with Spanish-American War costumes. We publish this photo through the kindness of Mr. William P. English, of Hartford, who, though present, was only a buck private at the time and so wasn't allowed in the picture. There's a man with interesting experiences as a pioneer in radio! After ten years he gave it up as a bad job and got out of radio in 1912, before many of to-day's hams were born. And yet we read in some of our more colorful contemporaries that radio is still in its infancy!

K. B. W.

There were only two of the scheduled transmissions from W3CXM due to failure of power, and skip distance prevented many localities from copying the message from WLM on 6990 kc. However, many Corps Area and State Control Stations rose to the occasion and rebroadcast the message the 3500-kc. band at different times so that

CORPS AREA STANDINGS

Corps Area	A.A.R.S.	Total Number Amateurs
	Activity Percentage	Submitting Copies
First	97.72	48
Second	93.02	54
Fifth	90.14	70
Ninth	66.91	104
Seventh	60.27	132
Third	52.00	20
Fourth	48.59	53
Eighth	42.55	23
Sixth	38.57	38
Accuracy Percentage		
Third	98.70	20
Fifth	98.52	70
Eighth	98.45	23
First	97.76	48
Seventh	97.63	132
Ninth	97.52	104
Fourth	97.47	53

Second	97.20	54
Sixth	95.47	38

nearly all that were on the air to make copy succeeded in getting it from some source. There was a noticeable drop in accuracy percentage in 1931 as compared to previous years. This was due in general to the fact that several of the stations that rebroadcast had a copy which contained an error. However, in view of the interference on the 3500-ke. band, which was considerably greater than in 1929 and 1930, and the fact that some incomplete messages rating from 25% to 75% accuracy were received, the accuracy percentages were fully up to expectations and the activity response of the A.A.R.S. was fully deserving of the context of the message of the Chief Signal Officer.

The Honor Roll list of all who copied the message follows:

FIRST CORPS AREA

WIAVT, WIBVW, WICCS, WIBLF, WIFL, WICJD, WIBAC, WIBJF, WIFL, WIAZN, WIATM, WIVF, WIAUC, WIBWB, WIBMXX, WIBLV, WIBEZ, WIAH, WIAMQ, WICPS, WIAZA, WIBAS, WIBER, WIAWU, WIAJC, WISZ, WIAZW, WIBTF, WICQN, WICEQ, WIATF, WIBVJ, WIALE, WICLN, WICCX, WIBJP, WISC, WIBVR, WILP, WINX, WIBD, WIAOI, WIBM, WIBOE, WICPG, WIBBZ, WINR.

SECOND CORPS AREA

W2BCO, W2AUS, W2OP, W2BPY, W2BPQ, W2AFT, W2ANV, W2WP, W2BDJ, W2AHG, W2SC, W2AQJ, W2CA, W2AZV, W2PF, W2OQ, W2BLU, W2BZW, W2BJA, W2UV, W2ACD, W2AGL, W2BDB, W2DEJ, W2AOY, W2AFT, W3AEJ, W3BAK, W3AOP, W3ZI, W3AIW, W3ARN, W3MA, W3HC, W8ELU, W8BYO, W8EFO, W8CKI, W8DOH, W8BME, W8DXF, W8ERP, W8EAG, W8ECA, W8EZX, W8CID, W8FUS, W8BFG, W8DZU, W8ESY, W8EWT, W3ASG, W2AOS, K4RJ.

THIRD CORPS AREA

W3CXK, W3SN, W3BED, W3TP, W3AFE, W3AKB, W3BWT, W3AOO, W3FJ, W3ANZ, W3MC, W3MG, W3OK, W8APQ, W8DVA, W8DYO, W8AYG, W8DPQ, W8UD, W8KX.

FOURTH CORPS AREA

W4ALQ, W5ACY, W4OH, W4EG, W4AEA, W5QJ, W4OI, W4HH, W4LQ, W4ABL, W4AWD, W4WS, W4BW, W4QZ, W4ANB, W4AGW, W4ATG, W4AJH, W5AUB, W4GS, W5FQ, W4WB, W4IA, W4ASQ, W4AQO, W5ZK, W4RS, W4OX, W4PM, W4DS, W4AFV, W4MN, W4RE, W4AFM, W4JW, W4AAD, W4AP, W4NF, W4DW, W4MA, W4AHG, W4AGI, W4KP, W4SS, W4EPA, W4ADB, W4AXB, W5AO, W4AAY, W4AFN, W4AIV, W4OL, W4AXD, W4ACZ.

FIFTH CORPS AREA

W8CHM, W8VP, W8CZR, W8DFR, W8AYK, W8BZL, W8HD, W8EK, W8JC, W8DDS, W8TI, W8BZB, W8BYD, W8EBY, W8BGX, W8BOW, W8AXV, W8CIO, W8CYN, W8MN, W8CKX, W8OCK, W8CDW, W8ZG, W8CNM, W8DH, W8BAS, W8DMK, W8MH, W8DVL, W8CGR, W8OK, W8CHE, W8EXA, W8BKM, W8BEX, W8CEI, W8NP, W8AHF, W8UW, W8BLB, W8AKH, W8CIY, W8ARP, W8DYG, W8CAY, W9FYB, W9CML, W9EDQ, W9AET, W9CIS, W9OX, W9AQV, W9FUT, W9DAK, W9BWJ, W9BEW, W9ARU, W9YV, W9BNE, W9TE, W9CNE, W9QT, W9GJS, W9EOM, W9QG, W9EQO, W8CRU, W8CNO, W8CML.

SIXTH CORPS AREA

W8BMG, W8SB, W8CPB, W8AZQ, W8HL, W8DCT, W8BRB, W8BDI, W8BAW, W8DDN, W8ENL, W8ETT,

W8VS, W8DVQ, W9GGF, W9AIU, W9DZU, W9AMO, W9DOU, W9BNL, W9ERU, W9ACU, W9FKO, W9EGZ, W9DWP, W9BAC, W9EUU, W9GEX, W9ANR, W9HLI, W9ACE, W9JO, W9ALW, W9GAI, W9BXR, W9ABS, W9FCW, W9CTP, W9CYT.

SEVENTH CORPS AREA

W5BLG, W5HN, W5LV, W5BKB, W5BRI, W5AAJ, W5BML, W5IQ, W5LK, W5EGJ, W9DYA, W9BBS, W9FQI, W9AZR, W9BJA, W9BGG, W9FLG, W9DFZ, W9EUN, W9FJZ, W9FLM, W9AKG, W9DNX, W9NM, W9FNH, W9BVF, W9DKJ, W9FJI, W9BNF, W9YC, W9EFJ, W9DM, W9IK, W9AAQ, W9DBR, W9FWL, W9ACL, W9FSF, W9DHQ, W9EVW, W9CHF, W9CDM, W9FLI, W9GQZ, W9EVQ, W9BNT, W9FLA, W9FWW, W9BOR, W9DID, W9AYC, W9DPG, W9CDW, W9DOY, W9BKK, W9CBM, W9CXW, W9HSM, W9CKV, W9EIM, W9FFD, W9EWO, W9DVQ, W9EFE, W9DHC, W9ARE, W9FEL, W9EYV, W9GFB, W9DH, W9AQX, W9CXT, W9FLT, W9EIV, W9DUN, W9BJV, W9EXP, W9FAD, W9FDB, W9ABE, W9GKB, W9DGL, W9ESL, W9DZW, W9BQV, W9DNZ, W9DDO, W9EEW, W9EUB, W9FAJ, W9EAT, W9BN, W9BRA, W9CTJ, W9FZX, W9DMY, W9ALO, W9AIR, W9GDA, W9EXK, W9EGI, W9BCT, W9GQC, W9EDI, W9BPK, W9DCM, W9FJV, W9DHF, W9EHW, W9AQG, W9DMO, W9FAL, W9HUI, W9FSZ, W9DZN, W9DB, W9ENF, W9FNL, W9EYG, W9FNU, W9FYM, W9DGS, W9DKL, W9CJD, W9CTW, W9NL, W9FKF, W9APT, W9FBR, W9CWG, W9EPD, W5FM.

EIGHTH CORPS AREA

W5CT, W5ALD, W5AQE, W5ALJ, W5WW, W5BRV, W5AZS, W5CS, W5BMU, W5NY, W5VQ, W5OW, W5ABT, W5AUL, W5QX, W6DRX, W6HS, W6ALU, W9CDE, W9EKQ, W9AYP, W9EAN, W9ESA.

NINTH CORPS AREA

W7FL, W7AYP, W7BCV, W7BLN, W7AVT, W7SY, W7ACJ, W7GR, W7AQK, W7IC, W7AWH, W7ACP, W7ATQ, W7AHS, W7AWO, W7AFT, W7GL, W7CU, W7AHF, W7AWZ, W7HX, W7EP, W7APE, W7EN, W7ALO, W7ID, W7NV, W7AFS, W7AFL, W7AYL, W7UJ, W7QP, W7AXJ, W7PE, W7AEC, W7AXG, W7KG, W7ANP, W6DWH, W6DLI, W6DPQ, W6DPJ, W6FFQ, W6UO, W6DVD, W6AV, W6AIF, W6FCP, W6BZU, W6ETJ, W6FAC, W6DXE, W6EUH, W6ON, W6AKW, W6CVL, W6ACL, W6DYK, W6EYS, W6DAM, W6DFR, W6PQ, W6BP, W6AAN, W6UW, W6BDD, W6MF, W6AMM, W6EU, W6DRT, W6CGJ, W6BRV, W6DKN, W6BCO, W6CIS, W6DWD, W6CQM, W6EFY, W6ETM, W6DHP, W6DQH, W6AJP, W6DLT, W6CZZ, W6DHE, W6AK, W6BLW, W6APM, W6DSP, W6EAF, W6YAU, W6GL, W6BLS, W6DZF, W6BEE, W6CMN, W6BPC, W6EFN, W6DZW, W6DEH, W6DCI, W6AAX, W6OZ.

ELECTION NOTICE

To all A.R.R.L. Members Residing in the NEW ENGLAND DIVISION:

1. You are hereby notified that Frederick Best has resigned as A.R.R.L. Director from the New England Division, because of removal from the said division, the resignation to become effective upon the election of his successor. You are also notified that a special election for A.R.R.L. Director is about to be held in the New England Division to fill the remainder of the 1931-1932 term left vacant by this resignation. Your attention is invited to Section 1 of Article IV of the constitution, providing for the government of A.R.R.L. affairs by a Board of Directors; Section

(Continued on page 86)

A Reversed-Current Feed-Back Oscillator

By Walter van B. Roberts*

THE dynatron oscillator has several features of great convenience, perhaps the most important for the amateur being, that for different frequency ranges the switching is simplified by the absence of any tickler coil or third connection to the tuned circuit. However, the dynatron is not a very strong oscillator and it is difficult to make it oscillate at the higher amateur frequencies. The circuit about to be described retains the convenience of the dynatron while increasing the tendency to oscillation something like five-fold.

Fig. 1 shows the plate current of a Type '24 tube plotted against plate voltage for two different values of control grid potential, the screen potential being fixed at a higher value than any

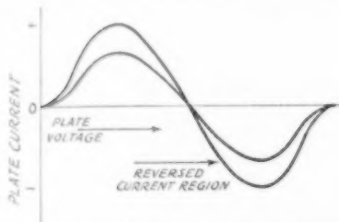


FIG. 1.—TYPICAL DYNATRON CHARACTERISTICS OF A TYPE '24 TUBE FOR TWO DIFFERENT VALUES OF CONTROL-GRID POTENTIAL

of the plate voltages represented. It will be seen that in the region of reversed plate current the magnitude of the plate current is controlled by the control grid potential just as in an ordinary

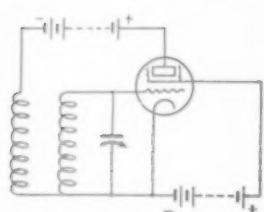


FIG. 2.—WHEN THE PLATE AND SCREEN-GRID VOLTAGES ARE ADJUSTED TO GIVE REVERSED PLATE CURRENT, OSCILLATION OCCURS WITH THE POLARITY OF THE TICKLER OPPOSITE TO THAT REQUIRED FOR THE USUAL REGENERATIVE OSCILLATOR

tube; that is, the more negative the control grid the less the magnitude of plate current. Hence, if a '24 tube is connected in the usual tickler type of feed-back circuit as shown in Fig. 2 and the plate and screen potentials are adjusted to give reversed plate current, it will be found that the polarity of the coupling between the tickler coil and the tuned circuit is opposite to that required with

an ordinary tube if oscillations are to be generated. This being the case a separate tickler coil may be dispensed with and the feed-back can be made by way of the inductance of the tuned circuit acting as a one-to-one auto transformer.

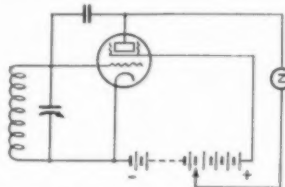


FIG. 3.—THE SEPARATE TICKLER COIL CAN BE DISPENSED WITH AND THE TUNED CIRCUIT USED AS AN AUTO-TRANSFORMER

This arrangement is shown in Fig. 3 where, in addition, shunt feed is provided to the plate so as to allow the use of a plate battery at cathode potential. The shunt-feed impedance Z may be of any nature that has high impedance to the oscillation frequency; or it may be an inductance of relatively low value provided that the inductance in the grid circuit is increased so that the two inductances acting in parallel have a suitable value for the desired tuning range.

Fig. 4 shows substantially the same arrangement except that the plate circuit is now series fed while the grid potential is made definite by the grid leak resistance or impedance.¹ In actual

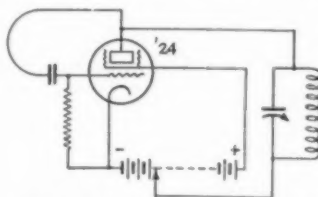


FIG. 4.—THE SAME CIRCUIT WITH SERIES PLATE FEED AND GRID-LEAK CONTROL-GRID BIAS

practice, especially at short waves, the refinements of Fig. 5 are desirable. Here the condenser between plate and grid is made variable in order to control the amount of feed-back, while radio-frequency chokes and by-pass condensers are used in the circuits from the screen and plate back to the cathode. It is essential that by-pass condensers be used which really act as condensers at the operating frequency. I found it necessary

¹ A similar circuit arrangement has been shown by F. M. Colebrook ("The Dynatron Oscillator," *The Wireless Engineer*, Nov., 1931) but he does not explain its functioning on the basis of reversed plate current. — Editor.

* Radio Corporation of America, 570 Lexington Ave., New York City.

The by-pass condensers C_3 should be non-inductive, air-dielectric condensers being preferable. C_2 is a small (midget) variable condenser to adjust the feed-back and R_1 a receiving-type grid leak. To obtain oscillation at frequencies above 20 mc. it may be necessary to insert a small inductance of 2 turns or so in series with the screen-grid by-pass condenser, as explained in the text.

If the adjustment of plate potential is made experimentally so as to obtain the maximum tendency to oscillate, the plate potential so chosen will probably not be the potential which gives the maximum value of reversed current and hence the maximum amount of feed-back action, but it will be a compromise value which will locate the operating point somewhere between the potential which gives maximum reverse current and that which gives zero plate current, thus making the circuit act simultaneously as a dynatron oscillator and as a reversed-current feed-back circuit.

The Roanoke Division Convention

Major Van Nostrand and his assistant Herdin were kept busy with examinations, and while this was going on the Traffic Meeting was being held in the Convention Hall, where talks were made by "Bob" Eubanks of Richmond, Va., and those interested in traffic. The Government's Radio Inspection Car was open for the visitors, and the equipment proved interesting to all. The afternoon brought some more good lectures: L. S. Fox, National Carbon Co., spoke on the new 2-volt air cell and its general construction; Roy C. Corderman, W3BEG, Transmitter Design and a simple method of measuring Field Strength. One of those good Southern banquets was served right on time with "Deacon" Gravely acting as Toastmaster. Short speeches were made by Lt. Wilson, U.S.N.R., Lt.-Comdr. Rogers, U.S.N., Judson Fox, Caveness, Key, Eubanks and Herbert, as well as Supervisor Van Nostrand and E. J. Gluck. There is one man we have not said very much about and that is A. L. Hege, President of the Winston-Salem Amateur Radio Club

33

The Type '39

A New R.F. Pentode for Receivers

THE new Type '39 tube is a member of the family of six-volt d.c. heater-type tubes popularly known as the "automobile" group. It is a variable-mu screen-grid pentode, which makes it a really different type of tube instead of simply another standard type with

taneous plate voltage cannot drop below the screen voltage without causing secondary emission and consequent distortion. In ordinary broadcast receiver design this effect is not particularly bothersome because high plate voltages can be used, but where the plate voltage is low, as in automobile and 110-volt d.c. receivers, the addition of the suppressor grid makes it possible to use a high screen voltage and low plate voltage without limiting the tube's output.

The use of the suppressor grid also makes the screen-grid characteristics more uniform, with the result that a series resistor instead of a potentiometer can be used for obtaining screen voltage from the plate supply.

Following are the preliminary ratings and characteristics of the Type '39:

Heater Voltage	6.3 volts d.c.
Heater Current	0.3 amperes
Plate Voltage	90 180 volts (max.)
Screen Voltage	90 90 " "
Grid Voltage	-3 -3 " (min.)
Plate Current	4.4 4.5 milliamperes
Screen Current	1.3 1.2 " "
Plate Resistance	375,000 750,000 ohms
Amplification Factor	360 750
Mutual Conductance (-3 v. bias)	960 1000 micromhos
Mutual Conductance (-30 v. bias)	10 10 " "
Interelectrode Capacitances	
Effective grid-plate	0.0007 μ fd. max.
Input	4 μ fd.
Output	10 μ fd.

Figs. 1 and 2 show the plate and mutual characteristics of the Type '39. These curves were furnished by the National Carbon Company.

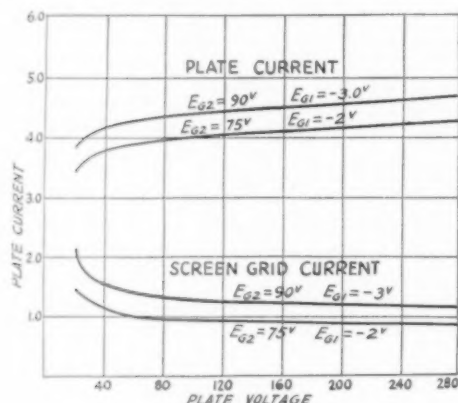
— G. G.

Strays

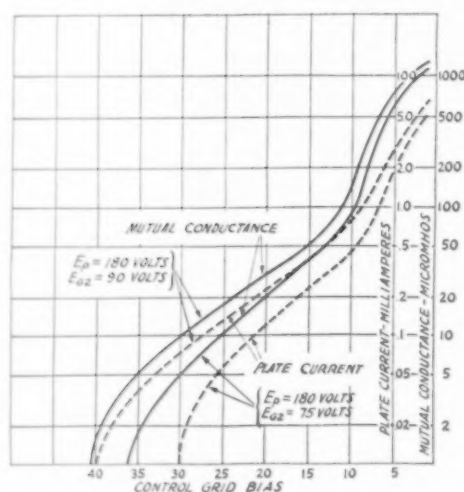
W9DZD discovered an ad for a BCL receiver in which are incorporated "self-heating" electrolytic condensers! He suggests they might be a welcome addition to a ham station in the cold attic in winter.

I. R. E. CONVENTION

The seventh annual convention of the Institute of Radio Engineers, which will be known as the Twentieth Anniversary Convention in commemoration of the founding of the Institute in 1912, will be held at the Hotel William Penn, Pittsburgh, Pa., April 7th-9th, 1932. Plans are being prepared for an excellent program of technical papers by prominent engineers as well as trips of high educational interest to those who will attend.



FIGS. 1 AND 2



slightly different ratings. In appearance it resembles the Type '36.

The chief feature of interest about the new tube is the fact that it is the first r.f. tube in which is included a suppressor grid. The reason for the pentode construction is quite clear when it is remembered that in the ordinary screen-grid tube the r.f. plate voltage swing is definitely limited by the screen voltage, since the instan-

Election Results

Four A.R.R.L. Directors Renamed, Three New Ones Elected

AT the end of every year the term of office of half of the members of the A.R.R.L. Board of Directors expires. During November and December of 1931, then, elections were held for Canadian General Manager and for six Division Directors, for the 1932-33 term. As a result, four directors have been renamed without competition and three have been replaced by new names.

CANADA

Mr. Alex Reid, VE3BE, our genial Canadian General Manager, was the only candidate named for that post for the coming term, wherefore he was declared reelected by the Executive Committee without the necessity of balloting by the Canadian membership.

ATLANTIC, DELTA, MIDWEST

Similarly in three United States divisions there was but a single candidate, in each case the incumbent, so that without balloting the following directors have succeeded themselves for 1932-33:

Dr. Woodruff, WSCMP..... Atlantic Division
Mr. Hill, W5EB..... Delta Division
Mr. Kerr, W9GP-DZW..... Midwest Division

DAKOTA DIVISION

In the Dakota, three candidates were put in nomination: Mr. Barker, W9EGU, the incumbent; Mr. L. E. Lindesmith, W9GKO of Duluth, Minn.; and Mr. Herman Radloff, W9AIR, Sleepy Eye, Minn. Mr. Radloff withdrew his name and the membership balloted between Mr. Barker and Mr. Lindesmith, the latter winning by a small but sufficient margin:

Lawrence E. Lindesmith..... 138
Cy. L. Barker..... 126

Mr. Lindesmith, the new director, has been in amateur radio for fifteen years, and during 1929 and '30 was president of the Arrowhead Radio Amateurs, our very active affiliated club of that region. For the past ten years he has been in the accounting division of the Minnesota Steel Co. He operates W9GKO at Duluth.

PACIFIC DIVISION

In our Pacific Division, vigorous campaigns were carried on in behalf of both of the candidates, Lt.-Commander Allen H. Babcock, W6ZD, director of the division since 1923, and Colonel Clair Foster, W6HM, the latter winning:

Mr. Foster..... 825
Mr. Babcock..... 367

Colonel Foster, the new director, is the well known W6HM of Carmel, Calif. With long experience in construction work, he is a reserve officer of the Quartermaster Corps, assigned as chief of the construction district that embraces the 8th and 9th Corps Areas, Alaska, Hawaii and the Philippines, and is on frequent active-duty status. He is perhaps best known as the proprietor of one of the most active ham stations on the coast.

SOUTHEASTERN DIVISION

In this division three nominations were filed: for Mr. Dobbs, W4ZA, the director for the past seven years; for Mr. J. C. Hagler, W4SS; and for Mr. E. M. Winter, W4HY. In accordance with our constitution our Executive Committee was obliged to declare Mr. Winter ineligible because he is commercially engaged in radio; so the balloting was between Mr. Dobbs and Mr. Hagler, resulting in the election of the latter:

J. C. Hagler..... 157
Harry F. Dobbs..... 117

Mr. Hagler is our very active section communications manager for Georgia, S. C., Porto Rico, Cuba and the Virgin Islands. In business life he is a director and the superintendent of production of the Georgia-Carolina Brick & Tile Co. A member of the U.S.N.R., his station, W4SS at Augusta, Ga., is also the Georgia net control station of the Army-Amateur Radio System.

QST, welcoming the new directors, feels that it speaks for the membership in expressing warm appreciation for the past services of the three retiring directors, who between them have contributed eighteen years of service to the A.R.R.L. Board.

K. B. W.

Book Reviews

Kurzwellentchnik (Short Wave Technique), by the technical department of the *Deutscher Amateur-Sende-und Empfangsdienst* ("D.A.S.D."). Published by the D.A.S.D., Blumenthalstrasse 19, Berlin W. 57, Germany. Clothbound, 304 pp. 6 x 8 3/4, 340 illustrations. Price to A.R.R.L. members, Rm. 9 (\$2.25) postpaid, direct from D.A.S.D.

Never have we so bemoaned our lack of knowledge of German as when we have taken in hand this German amateur's handbook. The sum total of the German in this office is about ten words, mostly "cuss-words" of course, none of which we can find in this book. We feel that we have in this manual a real incentive to learn "DASD-German," much as the international circulation of QST has made many

foreign amateurs feel that they simply had to learn "QST-English."

This book has been written to fill amongst German-speaking amateurs the same need that the A.R.R.L.'s *Handbook* does for English-reading hams. Its several chapters have been written by individual amateurs who are members of the D.A.S.D.'s technical committee, much as our *Handbook* is the work of various members of our headquarters staff. The general arrangement of material is similar. The book opens with a general discussion of amateur radio, engages in a solid discussion of the principles of electricity and the action of tubes with special consideration to their application in high-frequency amateur work, and proceeds to an examination of actual amateur practice. Here again there is a familiar arrangement: receivers, frequency meters, transmitters, radiophones, keying methods, antennas, power supplies, station arrangement, station operation, and an appendix of tables, charts and abbreviations. In addition there are highly interesting chapters on ultra-high-frequency work and on the mechanics of h.f. propagation. Fortunately for us, diagrams and photographs are the same in any language and this book is profusely illustrated, immensely helping the reader whose German is rusty. The book is rather more meaty than our *Handbook*, with typical German thoroughness devoting more space to theoretical foundation than it does to constructional specifications of the "how-many-turns" sort; but at that the apparatus chapters are illustrated with many examples of amateur-built equipment for both beginners and advanced amateurs — after the European practice, of course.

We predict that this book will be hugely successful, and we congratulate the D.A.S.D. technical committee upon its accomplishment. Amateurs who can read German will be exceedingly well advised to possess themselves of a copy.

Het Zendend Radio-Amateurisme in Nederland, by W. Keeman, traffic manager of the *Nederlandsche Vereniging voor Internationaal Radio-amateurisme*; published by N. Veenstra, The Hague; 76 pp. $6\frac{1}{4} \times 9\frac{1}{2}$; price f. 1.50. *Kortholke Amatøren*, edited by Helmer Petersen, secretary of E.D.R.; published by *Experimenterende Danske Radioamatører*, Box 79, Copenhagen; 111 pp. $4\frac{1}{2} \times 5\frac{3}{4}$; price 50 ore.

Speaking of foreign-language handbooks, here are two more which should prove useful to the amateur who knows one of these languages, particularly if he has not had access to the vast amount of amateur material which exists in English. Both books describe simple amateur equipment but devote most of their space to an explanation of amateur radio and its workings and methods, interpreting international ham abbreviations and practices into the native language. That, in fact, is precisely the purpose of both books — to act as a practical guide to the Dutch and Danish amateur, respectively, in their work on the air. They seem to serve the purpose excellently.

K. B. W.

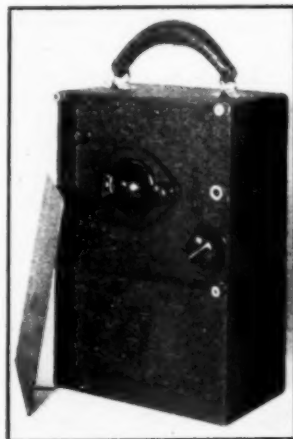
New Portable Receiver

WHILE a great many short-wave receivers are small enough to be carried from place to place without too much inconvenience, few are really portable, as we think of portable sets. The receiver shown herewith is designed for portable use in the field, and is therefore completely self-contained except for headphones and antenna.

The circuit is the conventional regenerative detector, with resistance control, and transformer-coupled audio. Two Type '30 tubes are used, the filaments being wired in series to work from

a 4.5-volt "C" battery. Space is provided in the case for two of the small 22.5-volt blocks for plate supply. A filament-control jack ensures turning off the "A" power when the front cover is put on.

The case itself is made of cast aluminum with a black crackle finish. Its shape is such that the set can be carried conveniently, a handle being



provided at one end for that purpose. A removable plate on the back, similar to that on the front but extending the entire length of the set, allows access to the "works" and batteries. Three coils are furnished, covering the range of frequencies between 15,000 and 3000 kc.

The complete shielding of the set also makes it useful as a monitor.

The receiver is a product of the Radio Engineering Laboratories, Long Island City, New York.

Strays

In drilling aluminum or other soft metal the jagged edges can be removed neatly by inserting the point of a knife-blade in the hole and rotating the blade around the edge. In this way the metal is not exposed to digs or scratches as in filing or hammering the edges.

— W1CPH-W8EJX

We are sorry to have to report that Mr. Frederick Best, formerly WIBIG of Augusta, Me., is resigning as New England Director of the A.R.R.L. because of non-residence. He is now located in Fargo, N. D., with the airways division of the Department of Commerce, and his ham call is now W9EFF. He has been a well-liked director and will be missed by his New England friends. Elsewhere in this issue there is notice of a special election which will result in the selection of his successor shortly before the annual meeting of the board. Mr. Best continues as the director, of course, until his successor is elected.

A Direct-Coupled Amplifier for the Dynatron Oscillator

By E. G. Fraim*

THE oscillator and r.f. amplifier to be described were built with the intention of eliminating as much as possible the frequency drift of the dynatron, yet retaining stability in operation and giving sufficient output to use the harmonics for frequency measurements.

The first trial was with a regular dynatron oscillator using a moderate amount of fixed capacity across the tuning condenser. This was coupled to an r.f. amplifier through a very small condenser, coupling being taken direct from the plate of the oscillator tube through the small condenser to the grid of the amplifier tube. This combination worked well so far as harmonic output was concerned but the oscillator was unstable because of the losses it had to supply. This method was discarded and several others were tried, but invariably either the losses were too high or the coupling was not sufficient for proper excitation of the r.f. amplifier.

Direct coupling was then thought of, tried and found to work very nicely as long as the grid of the amplifier tube was kept negative through the full swing of its input voltage. Harmonics were very strong and the oscillator was as stable as when operating alone. This step fixed the harmonic question but the drift as the tube warmed up was very bad. The minimum tank capacity was then increased from 40 $\mu\text{fd.}$ to 150 $\mu\text{fd.}$ Not so good. The fundamental frequency was then shifted to cover the band 1700 to 2050 kc. by increasing the inductance in the tank circuit. Once more the oscillator was stable and harmonics were audible to 28,000 kc. with good volume.

The parts for this oscillator-amplifier were all taken from the junk box and no finished job has been made of the set-up at present, so exact values of capacity and inductance cannot be given here. An old 23-plate receiving condenser was dismantled and rebuilt for the tank capacity C_1 . All but three plates were removed from the rotor and three circular discs were cut from shielding and put on the rotor with the three regular plates, these circular plates giving the necessary fixed minimum tank capacity of about 150 $\mu\text{fd.}$ Let it be stated here that this condenser should be very rugged and low-loss if the set-up is to be used for frequency measuring purposes. The tuning inductance, L_1 , has 40 turns of No. 32 enameled wire close-wound on a one-inch form. This value is only approximately right and will be subject to variation, depending on the

condenser C_1 and how much plate trimming is necessary to get full band-spreading on the dial.

The choke RFC_2 is made by winding 150 turns of 32 d.c.c. wire on a one-inch form. This choke should be cut until it is resonant at about 2050 kc. RFC_1 has 200 turns of 32 d.c.c. wire on a $\frac{1}{2}$ -inch form. Manufactured chokes also will work nicely. Resistance R_3 is a voltage divider from a "B" eliminator. This is used so that all leads not choked will not leave the shielding and it also makes all connections short. Condenser C_4 should be a mica condenser moulded in bakelite. Condensers C_4 may be any good grade by-pass condensers. No lay-out of equipment is specified

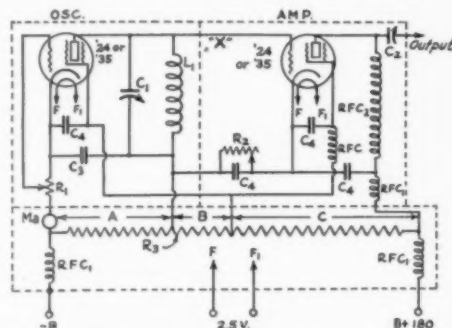


FIG. 1.—THE DYNATRON OSCILLATOR WITH DIRECT-COUPLED AMPLIFIER

- L_1 — 40 turns No. 32 enameled wire close-wound on 1-inch diameter form.
- C_1 — Band-spread tuning condenser. See text.
- C_2 — 15-plate midget condenser.
- C_3 — 0.01- $\mu\text{fd.}$ by-pass condenser, mica type.
- C_4 — 0.25- $\mu\text{fd.}$ by-pass condensers, paper type.
- R_1, R_2 — 2000-ohm potentiometers.
- R_3 — "B" Eliminator voltage divider, total resistance 12,700 ohms divided as follows: "A", 4000 ohms; "B", 3650 ohms; "C", 5050 ohms.
- RFC_1 — 200 turns of No. 32 d.c.c. on $\frac{1}{2}$ -inch diameter form.
- RFC_2 — 150 turns of No. 32 d.c.c. on 1-inch diameter Bakelite tube.
- MA — 0-10 d.c. milliammeter.

but all leads should be as short as possible, the wire "X" being shielded if trouble is had with the r.f. stage oscillating. For best lay-out of the oscillator refer to the latest A.R.R.L. Handbook. The amplifier may be arranged as is convenient.

The complete job should be shielded as shown by the dotted lines on the circuit diagram. R_3 and its two chokes, RFC_1 , may be mounted under the sub-panel. After the job is finished and the chokes and tank inductance are cut right they should be given a coat of Duco to secure the windings permanently. The potentiometer R_1

*4360 Marlborough Avenue, San Diego, California.

should be mounted on the panel along with the milliammeter. R_2 may be mounted inside the shield can, because when once set it need not be touched again unless tubes are changed.

Either Type '24 or '35 tubes may be used, but '35's are better by far than the '24's. The pick-up wire "P" may be placed close to the receiver or hooked onto the antenna post, if necessary, to get the required signal strength. Adjusting C_2 will help control the output of the amplifier also. Before the oscillator is calibrated all adjustments should be made and left fixed, except C_1 and R_1 , until the oscillator can be recalibrated.

The calibration and use of the rig are the same as those of the regular dynatron frequency meter and will not be explained here. For greatest accuracy the tubes should be allowed to warm up for about thirty minutes before use. If this is done the accuracy of the meter will probably exceed that of the regular dynatron, because this meter is not subject to body capacity or external fields like an unshielded meter and too much coupling will not affect calibration in the least. If an inaccuracy of 0.5% is not objectionable the meter may be used after being turned on for about three minutes.

Standard Frequency Transmissions

DATES OF TRANSMISSION		
Date	Schedule	Station
Feb. 5th, Friday	C	W6XK
Feb. 7th, Sunday	C	W1XP
Feb. 12th, Friday	A	W1XP
	B	W9XAN
	B	W6XK
Feb. 19th, Friday	BB	W1XP
	B	W9XAN
	A	W6XK
Feb. 20th, Saturday	BX	W6XK
Feb. 21st, Sunday	C	W9XAN
Feb. 26th, Friday	BB	W6XK
	B	W1XP
	A	W9XAN
Feb. 28th, Sunday	BB	W9XAN
	C	W6XK

STANDARD FREQUENCY SCHEDULES					
Friday Evenings			Friday and Sunday Afternoons		
Schedule and Frequency			Schedule and Frequency		
Time (p.m.)	A	B	Time (p.m.)	BB	C
	kc.	kc.		kc.	kc.
8:00	3500	7000	4:00	7000	14,000
8:08	3550	7100	4:08	7100	14,100
8:16	3600*	7200	4:16	7200	14,200
8:24	3700	7300	4:24	7300	14,300
8:32	3800		4:32		14,400
8:40	3900				
8:48	4000				

Saturday Morning	
Schedule and Frequency	
Time (a.m.)	BX
	kc.
4:00	7000
4:08	7100
4:16	7200
4:24	7300

* W6XK transmits 3650 kc. instead because of local interference on 3600 kc. from fourth harmonic of 906-kc. transmitter.

The time specified in the schedules is *local standard time at the transmitting station*. W1XP uses Eastern Standard Time, W9XAN, Central Standard Time, and W6XK, Pacific Standard Time.

TRANSMITTING PROCEDURE

The time allotted to each transmission is 8 minutes, divided as follows:

2 minutes — QST QST QST de (station call letters).

3 minutes — Characteristic letter of station followed by call letters and statement of frequency. The characteristic letter of W1XP is "G"; that of W9XAN is "O"; and that of W6XK is "M."

1 minute — Statement of frequency in kilocycles and announcement of next frequency.

2 minutes — Time allowed to change to next frequency.

THE TRANSMITTING STATIONS

W1XP: Massachusetts Institute of Technology, Round Hill Research, South Dartmouth, Mass., Howard A. Chinn in charge.

W9XAN: Elgin Observatory, Elgin National Watch Company, Elgin, Ill., Frank D. Urie in charge.

W6XK: Don Lee Broadcasting System, Los Angeles, Calif., Harold Peery in charge.

REPORT BLANKS

Blanks for reporting on the regular S. F. transmissions will be sent postpaid upon request. Just send a card or message to the Standard Frequency System, QST, West Hartford, Conn., asking for S. F. blanks.

WWV 5000-KC. TRANSMISSIONS

The 5000-kc. transmissions of the Bureau of Standards station, WWV, are given every Tuesday continuously from 2:00 to 4:00 p.m. and from 8:00 to 10:00 p.m., E.S.T. The accuracy of the frequency is at all times better than a part in a million. Reports and communications concerning WWV transmissions should be addressed to the Bureau of Standards, Washington, D. C.

— J. J. L.

Some Appreciated Assistance

(Continued from page 23)

Mr. K. B. WARNER, November 17, 1931.
American Radio Relay League,
West Hartford, Connecticut.

Sir:

The Department is pleased to acknowledge the receipt of your letter of November 10, 1931, with reference to an exchange of communications between amateur radio stations upon the initiative of the San Francisco Signal Post of the American Signal Corps Association. Note has been taken of the statements made by the Chief Signal Officer and the Chief of Naval Operations with respect to the importance of the radio amateur.

Very truly yours,

For the Secretary of State:
W. R. CASTLE,
Under Secretary.

The International Goodwill Tests

February 20th–26th, March 10th–16th

ALL set for some new DX records? Last month¹ *QST* announced all essential details of these tests so that this information might reach amateurs in every part of the world in time for them to take part. Many stations are receiving special overhauling for the tests. Comments have been received from various sources and a few at random may be of interest.

"There will be thousands of hams all over the world who will be on the job during these tests — striving for new records, and seeking new worlds to conquer."

"... a step to increased interest in amateur radio and all amateur activities."

"Arrangements have been made for practically a continuous watch at our station. The tests ought to be made an annual event."

"We are making an automatic key for use in the transmitting-listening periods of the first three days."

North American Amateurs will be glad to know that arrangements for the tests have proceeded apace, and fullest coöperation has been assured on every hand. All A.R.R.L. Official Broadcasting Stations, the Headquarters station, and others are temporarily discontinuing all schedules that conflict with the quiet hour periods for listening for international DX. The friendly spirit of coöperation with which this test announcement was everywhere received is noteworthy, and is much appreciated. Thanks to Captain Baldwin and Commander Lee, the A.A.R.S. and U.S.N.R. nets will coöperate fully, as indicated in official communications from the War Department and Navy Department, portions of which are now quoted:

"The Army Amateur Radio System will cancel existing schedules and operation during the quiet periods in the International Goodwill Tests. Operators will be instructed not only to refrain from transmitting during the silent periods, but, insofar as possible to participate in the tests themselves... this office is prepared to furnish one hundred per cent coöperation not only in this test but in any future test sponsored by the A.R.R.L."

NORMAN LEE BALDWIN,
*Captain, Signal Corps, Liaison Officer,
Office of the Chief Signal Officer.*

"Only 10th March falls on a Thursday, on which date we will conduct our usual national drill between the control stations on 4045 or 3475 kes., but these operations will not be within the amateur bands. We will give instructions by radio between now and then to the effect that

local district radio drills involving the operation of reserve-amateur stations are to be suspended on that night. It is hoped that this will entirely clear the way as far as any Naval Reserve activities are concerned."

WM. JUSTICE LEE,
*Lieutenant-Commander, U.S.N.R.,
Office of Chief of Naval Operations.*

All that remains to make the tests fully successful is to receive full individual coöperation of every ham. The table on the opposite page should be practically self-explanatory for all North American amateurs who have read the announcement of last month. Starting time and date, "quiet" periods, and the ending time are shown. The part of the "master" table of listening periods² for each continent that applies to the continent of North America has been converted from Greenwich into each special brand of time used on this continent, with notations and special explanation below the table. You will note that, in North America, the tests open on the evening of February 20th (and March 10th). Every amateur is requested to observe the stated listening periods with the utmost care. Transmissions may be made at any other times than in the two-hour and one-hour listening periods stipulated in the body of the table. Observance of absolute *q u i e t* in the listening periods is of the utmost importance, so that foreign DX can be received on all our frequency bands without the usual amount of local interference from our own stations.

All Amateurs in other continents than North America: Quiet period listening schedules for *your* continent are indicated in the table that appeared on page 42 of *QST* for January. From that table you should prepare a local time-table for your station, in your own kind of time. Each of the six continents operates on a different schedule, so your local chart will differ from the one presented herewith, although of quite similar general appearance. Comparison of column four (North America) in last month's *QST*² and the expanded North American table given herewith may help if any trouble is experienced in making such a table for the other continents and countries. Follow the general instructions on how to take part and report results at the end of the tests. Results showing how many reports were received on your transmissions from each country will be shown in *QST* as soon as possible after these schedules are completed.

To All Participants: Special precautions should be observed to avoid off-frequency operation, also

¹January 1932 *QST*, page 41.

²January 1932 *QST*, page 42.

operation in any quiet hour periods for your continent, since the work of stations sufficiently discredited for either of these reasons will be eliminated from the results.

A.R.R.L. Official Observers are asked to be on the job as much as possible during these tests in order to insure a high degree of frequency observance. Full reports covering just the period of the contest are requested from each observer regarding frequency measurements made and stations notified.

All participants are requested to take notice of any operation by amateurs outside the proper frequency bands, and to be specific in reports of date, time, frequency, etc., on such stations. Likewise reports of stations in any continent (including your own) that are observed sending in a listening period "off schedule" for any reason are requested in full.

Amateurs outside the U. S. A., Canada, Newfoundland and other parts of North America are requested *not* to work or log (for listings) any North American stations transmitting in periods when North American stations are supposed to

be quiet, listening for international DX. They should make a special memorandum of such "discredited" stations to send A.R.R.L. as a supplement to their official reports on the tests.

How to Take Part: Read the full announcement printed in the last issue. Follow the "listening" schedule for your continent carefully. Transmit on any amateur frequency you wish at any time except in listening periods. Report "calls heard and worked" to A.R.R.L.

How to Report: For each six-day period tabulate a list of calls heard and worked by frequency bands, by continents, and by countries. List all calls in alphabetical-numerical sequence. Show your name, address, and call somewhere on each sheet of your report.

Summarize the time you find best for work on particular frequencies with particular continents and countries. Attach the memorandum on any off-frequency or off-schedule stations observed by you. Add any comments desired. Send the report to A.R.R.L., 38 LaSalle Road, West Hartford, Conn., U. S. A.

— F. E. H.

INTERNATIONAL GOODWILL TESTS

Test Starts	NORTH AMERICAN LISTENING PERIODS				Two-Way DX No Special Schedules Feb. 24-25-26 and March 14-15-16	Test Ends
	Date	Feb. 20 and March 10	Feb. 21 and March 11	Feb. 22 and March 12	Feb. 23 and March 13	
G W R I E C E H N	0000 Feb. 21 and Mar. 11		0300-0500 0900-1100 1500-1700 2100-2300	0100-0300 0700-0900 1300-1500 1900-2100	0000-0100 (4) 0500-0700 1100-1300 1700-1900 2300-2400 (4) (5)	2400 Feb. 26 Mar. 16
A	8 p.m. Feb. 20 and Mar. 10	11 p.m. to (1)	→ 1 a.m. 5 a.m.-7 a.m. 11 a.m.-1 p.m. 5 p.m.-7 p.m. (2) 9 p.m.-11 p.m.	3 a.m.-5 a.m. 9 a.m.-11 a.m. 3 p.m.-5 p.m. (3) 8 p.m.-9 p.m. (4)	1 a.m.-3 a.m. 7 a.m.-9 a.m. 1 p.m.-3 p.m. 7 p.m.-8 p.m. (4) (5)	8 p.m. Feb. 26 Mar. 16
E	7 p.m. Feb. 20 and Mar. 10	10 p.m.- midnight (1)	4 a.m.-6 a.m. 10 a.m.-12 Noon 4 p.m.-6 p.m. (2) 8 p.m.-10 p.m.	2 a.m.-4 a.m. 8 a.m.-10 a.m. 2 p.m.-4 p.m. (3) 7 p.m.-8 p.m. (4)	0 -2 a.m. 6 a.m.-8 a.m. 12 Noon-2 p.m. 6 p.m.-7 p.m. (4) (5)	7 p.m. Feb. 26 Mar. 16
C	6 p.m. Feb. 20 and Mar. 10	9 p.m.-11 p.m. (1)	3 a.m.-5 a.m. 9 a.m.-11 a.m. 3 p.m.-5 p.m. (2) 7 p.m.-9 p.m.	1 a.m.-3 a.m. 7 a.m.-9 a.m. 1 p.m.-3 p.m. (3) 6 p.m.-7 p.m. (4) 11 p.m. to	→ 1 a.m. 5 a.m.-7 p.m. 11 a.m.-1 p.m. 5 p.m.-6 p.m. (4) (5)	6 p.m. Feb. 26 Mar. 16
M	5 p.m. Feb. 20 and Mar. 10	(1) 8 p.m.-10 p.m.	2 a.m.-4 a.m. 8 a.m.-10 a.m. 2 p.m.-4 p.m. (2) 6 p.m.-8 p.m.	0 -2 a.m. 6 a.m.-8 a.m. 12 Noon-2 p.m. (3) 5 p.m.-6 p.m. (4) 10 p.m.-midnight	4 a.m.-6 a.m. 10 a.m.-12 Noon 4 p.m.-5 p.m. (4) (5)	5 p.m. Feb. 26 Mar. 16
P	4 p.m. Feb. 20 and Mar. 10	7 p.m.-9 p.m. (1)	1 a.m.-3 a.m. 7 a.m.-9 a.m. 1 p.m.-3 p.m. (2) 5 p.m.-7 p.m. 11 p.m. to	→ 1 a.m. 5 a.m.-7 a.m. 11 a.m.-1 p.m. (3) 4 p.m.-5 p.m. (4) 9 p.m.-11 p.m.	3 a.m.-5 a.m. 9 a.m.-11 a.m. 3 p.m.-4 p.m. (4) (5)	4 p.m. Feb. 26 Mar. 16

Note that normally there are four hour sending periods between each of the two hour listening periods indicated in the table. Some breaks in this arrangement occur at the beginning and end of each 24-hour "test day" due to the fact that the periods are rotated from day to day, so that all the listening periods added together will make one complete twenty-four hour day of listening-in. Exceptions are indicated as follows: (1) Three hours to transmit between the start of the test and the first listening period. (2) Two hours only for a sending period between "test days" (which change the rotated schedule at the Greenwich meridian). (3) Three hours only for a sending period between the second and third "test day." (4) Half of a two-hour listening period which the schedule splits between the beginning and end of the third "test day" for North American amateurs. Amateurs in Asia and South America will find a similar "split" listening period at the end of the first and second "test days" respectively when they convert the skeleton table of times for their continent, given on page 42 of QST last month to their local time. (5) Three whole days follow the listening period given last above, two-way transmitting and testing continuing until the date and time indicated in the column on the extreme right under "test ends."

AMATEUR RADIO STATIONS

W8CPC, Buffalo, N. Y.

W8CPC is owned by Dr. Burton T. Simpson, 108 Homer Avenue, Buffalo, New York. Through the generosity and coöperation of the OW the use of an entire room on the second floor was made available for a radio shack. Off this room is a large closet which is utilized as a workshop, and thus all the ham activities are confined to one portion of the house.

The photograph represents one corner of the room where the transmitters are located. The station began in a modest way using a Hartley circuit with a Type '10 tube, which soon was replaced by a 50-watter in a tuned-plate tuned-grid circuit. About this time crystal control began to be advocated for amateurs and a 40-meter crystal-control outfit was built. A description of the station at this period appeared in *QST* for June, 1928. Before the amateur bands were narrowed most of the transmissions at W8CPC were on the 40-meter band, although the 20- and 80-meter bands were used occasionally. For the past year and a half the station has worked exclusively on 20 meters.

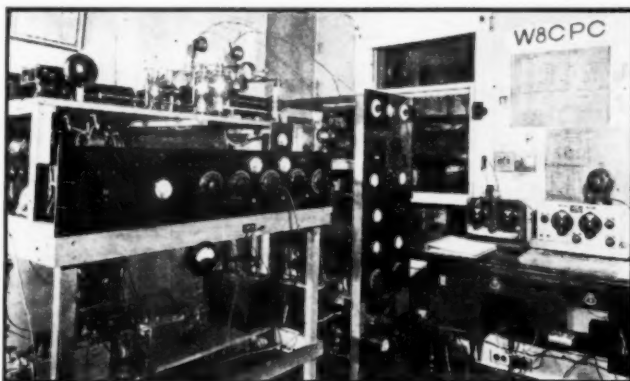
It will be noted from the photograph that there are two transmitters, the one at the left being built "bread-board" style and used for c.w. only. The one on the right is a 'phone outfit and is built in tiers. The circuits are the same in both transmitters, using 160-meter crystals and a Type '10 tube for the oscillator. The next two doublers are '10's and the last doublers 845's.

The power amplifier in the c.w. job is placed on a superstructure and is inductively coupled to the last doubler. The amplifier consists of four 852's in push-pull parallel. On the lower shelf are the power packs which supply the oscillator and doubling stages. At the right-hand end of the lower shelf is the a.c. power pack for "C" bias, which is common to both transmitters.

The 'phone transmitter has the power packs on the first shelf, the oscillator and first doubler on the second shelf, the second and third doublers

on the third shelf and the amplifier on the top shelf. The amplifier in this case consists of two 852's in push-pull.

A compartment built out from the window to the right of the 'phone transmitter is utilized for the shielded box which contains the modulator unit, the tube being an 845. Behind the transmitters is a plate glass window which has been cut in the back of the house for the purpose of bringing in the antenna leads. The antenna at present is a full-wave 20-meter Zepp, the parallel leads being fastened to connecting rods penetrating the plate glass. In the picture one can see the two ammeters which, by means of a plug-in arrangement, connect the antenna with either of the transmitters. A change-over from one transmitter to the other is accomplished by throwing three switches and changing over the antenna lead-in wires—in less than 30 seconds.

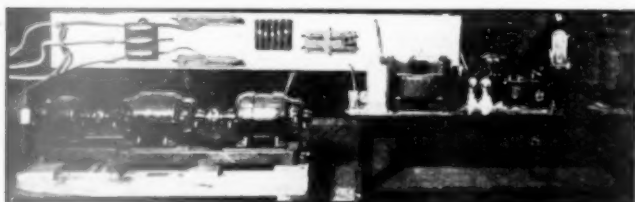


A VIEW OF W8CPC SHOWING THE C.W. TRANSMITTER AT THE LEFT, 'PHONE TRANSMITTER IN THE CENTER, AND THE OPERATING TABLE AT THE RIGHT

The two receivers are a regular regenerative set for c.w. and a superheterodyne for 'phone.

The power supply for the amplifier stages, shown in a separate photograph, is located in the attic. There are two separate supplies, one a high-voltage motor-generator set and the other a mercury-arc outfit. The voltage output of the generator can be varied from 700 up to 2200 volts by means of switches and a field rheostat. It will be noted in the photograph that the base of the motor generator rests upon four Ford clutch springs underneath which are thick squares of felt. This arrangement eliminates

noise and vibration. The transformer for the mercury arc is tapped for 2000, 2500 and 3000 volts. The filter consists of a 40-henry choke with 4 mikes ahead and 2 mikes behind. In back of the motor generator is the switchboard which shows radio-frequency chokes, high-power switches, 250,000-ohm bleeder and the a.c. switch. To change from one supply to the other it is only necessary to throw the 3 switches.



W8CPC'S HIGH-VOLTAGE POWER SUPPLIES

On the operating table, to the left, is a receiver used for c.w. This has a detector and two stages of audio using a.c. tubes; to the right is a super-heterodyne for 'phone work. Contained in each end of the operating table are the power packs for the receivers. The switches that control the transmitters are on the wall above the c.w. receiver. The one on the right controls the receiver and the filaments of the transmitting tubes and is left on continuously when the station is in operation. To the left of it is the operating switch.

Not shown in the picture but to the right on another table is the condenser microphone and the audio amplifier which feeds the grid of the modulator tube.

W8CPC is always glad to see amateurs from other cities and a cordial invitation is extended to all to visit the station when in Buffalo.

W7AME, Portland, Oregon

RAYMOND STENNETT of W7AME put his first transmitter on the air April 27, 1930. The first transmitter was a Hartley, using a Type '10 with 400 volts on the plate. A few months later, Thurlow Wauchope, W7LI, moved most of his equipment to W7AME, and the combination resulted in a far better transmitter. The station thereby became the joint property of W7AME and W7LI.

The present transmitter is crystal-controlled, starting out with a Type '10 oscillator with 180 volts on the plate, supplied by a Majestic "B" eliminator. The second and third stages are pentode '47's used as doublers and buffers. The plate supply for the pentodes is derived from a 400-volt Thordarson power transformer, using a Type '80 as a rectifier, with a brute force filter. The pentode feeds a push-pull amplifier, using

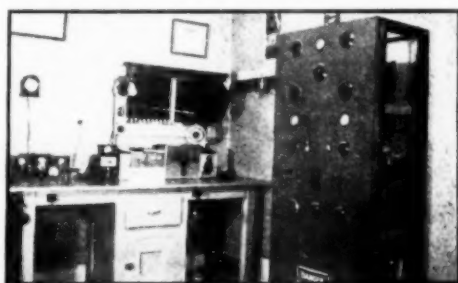
Type '10's with 600 volts on the plates. The push-pull stage is the modulated amplifier for 'phone. The modulator tube is a UV-211 with 1000 volts on the plate. The '10 push-pull stage is followed by two '52's in push-pull with 1100 volts on the plates. This stage is used as a linear amplifier for 'phone. The plate supply for the push-pull stages and the modulator is derived from a G.E. power transformer, using two R3

Rectobulbs and a brute force filter. The input to the last stage is about 300 watts. Jacks are used to cut down the number of meters required.

The modulator has one stage of speech amplification, with a Frost single button microphone. Grid bias is supplied by "B" batteries.

The transmitter frame is made of wood and the panel is three-ply veneer board. A current-squared thermocouple galvanometer is used to facilitate quick tuning when changing frequency. The transmitter can be operated on six different crystal-controlled frequencies.

The receiver to the left is built in a fish-tackle box and is used for portable work. The circuit is the conventional two-circuit detector with a stage of screen-grid radio-frequency amplification



W7AMESHows AN EFFECTIVE STATION LAYOUT

added and uses one stage of audio. The tubes are the Type '30 and '32 two-volt tubes.

To the right of the receiver is the control box. All power controls for the transmitter and receivers are brought out to this box. The receiver on the right uses the same circuit as the portable except that Type '22 and '01-A tubes are used. The monitor is at the extreme left. There are two keys conveniently placed to the right of each receiver.

The antenna is a Zepp with a 132-foot flat top and 60-foot feeders, strung between a 75-foot lattice mast and a 40-foot pole.

Raymond Stennett also owns and operates portable W7BHA. The portable transmitter uses a TNT oscillator using a Type '01-A tube,

feeding a Type '10 power amplifier. Power is derived from a 550-volt aircraft generator driven by a one-cylinder gasoline engine, and when a.c. power is available a 400-volt power pack is used.

W7AME is a Naval Reserve Station. All U. S. districts having been worked and some foreign contacts made. The results with 'phone have been usually satisfactory. Only 80-meter 'phone is used at present.

W2BPD, Brooklyn, N. Y.

FROM a Handbook oscillator to crystal control is the story of W2BPD, owned by G. W. Walastis, 1284 Halsey St., Brooklyn, N. Y.

The transmitter works chiefly on 14,000 kc., although it can be used on other bands. Type '10 tubes are used in the oscillator, doublers and intermediate amplifier, with an 852 as a final amplifier on all frequencies. As the photograph shows, it is a rack-and-panel job. The lowest panel holds the control switches; that above it the oscillator and 7000-kc. doubler; the third the 14,000-kc. doubler and the Type '10 intermediate amplifier. The latter tube also may be used as a 28,000-kc. doubler. The top shelf contains the Type '52 final amplifier and antenna tuning equipment.

Two power supplies are used. The smaller supply, which furnishes power for the 210 tubes only, has a 600-volt full-wave transformer with a pair of 866 rectifiers. Directly after the rectifier is a single 30-henry choke and 9 μ d. of capacity. At this point the voltage for the doublers and intermediate amplifier is tapped off. A dropping resistor cuts down the voltage for the oscillator and a second filter consisting of a 30-henry choke and 12 μ d. of condenser provides further smoothing.

The main power supply furnishes 1100 or 1800 volts for the 852. A pair of R3 Rectobulbs and a 36-henry choke with 3 μ d. are used here.

The receiver is an a.c. set using one stage of tuned r.f., screen-grid detector and two audio stages. The "monitor" on the table beside the small control panel is a five-meter receiver. A five-meter transmitter has been added to the station since the pictures were taken.

A Zepp antenna measuring 33 feet top with 16-foot feeders is used for 14,000 kc. and a 66-foot single wire feeder antenna for 7000 kc.

The Southeastern Division Convention

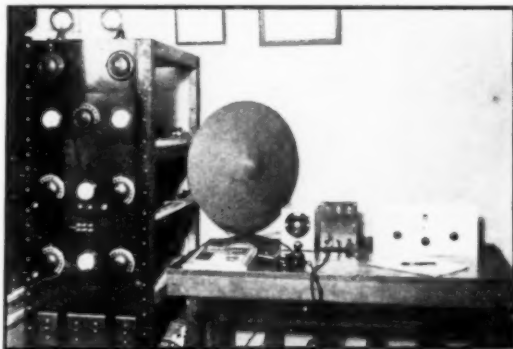
CAN you imagine some fifty "hams," yl's and ow's, in bathing suits lying on a sandy beach, with a yellow piece of paper in front of each, participating in a code speed contest with Major Van Nostrand, the radio supervisor, as one of the judges? Well, that's exactly what took place at the Fourth Annual Southeastern Division Convention held in Jacksonville, Fla., on September 18th and 19th. And what fun! ENTERTAINMENT in capital letters was the keynote of the whole convention. Beginning early Friday morning, the corridor of the Hotel George Washington was crowded with amateurs arriving from every section of the division, with Miami leading with one of the largest delegations. Of course, there were a few talks; A. A. Hebert of A.R.R.L. headquarters had brought his dynatron frequency meter and did his best to get the "gang" frequency-minded. M. L. Patterson, the Master Oscillator, of the Knights of Kilocycles, a real 'phone organization, spoke of the accomplishments of the organization and the good fellowship which exists in his section of the country. A round of visits was taken, going to the Department of Commerce Airways Radio Station, the Clyde Steamship Co. and Merchants & Miners ships at the docks, where a good opportunity was given to see modern marine equipment. Major Van Nostrand and his assistant were kept busy conducting examinations with some 60 amateurs doing their best to obtain the blue ticket. The first evening was spent around the Jacksonville "hamshacks" and, from the

way the fellows straggled in the next morning, they must have been working the VK's and Zedders. Then there were diving and swimming contests, and the Pensacola fellows won practically everything. Unfortunately this reporter lost the list with the names of contest winners, and is unable to give the names of those who won some of the very fine prizes donated by the radio

manufacturers and suppliers. George Schall spoke for the 'phone group, and the several points brought up were answered by Director Harry Dobbs and Fieldman Hebert.

After returning to the hotel in the late afternoon, the delegation prepared itself for the eve-

(Continued on page 46)



THE TRANSMITTER AT W2BPD IS CRYSTAL-CONTROLLED, AND USES AN 852 IN THE FINAL STAGE

EXPERIMENTERS' SECTION

HANDY COIL MOUNTING

IN making plug-in receiving or transmitting coils which are of such size that they cannot be wound on tube bases, secure a dozen or so phone tips, tap out the sleeve end with a 6-32 tap and fasten this tip to the coil form by screwing a 6-32 brass machine screw through the coil form into the tip, as shown in Fig. 1. In case the coil form is of thin material, fiber or brass washers can be used on both sides of the coil form walls to strengthen it.

These tips can be conveniently plugged into tip jacks, which made a good tight connection and hold the coils steady, whereas a wire fastened to the coil and inserted into a binding post leaves the coil wobbly and inconvenient to handle, with a possibility of a loose connection.

— Samuel W. Bayliss, W4ARF

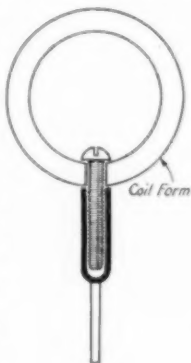


FIG. 1

THE TWO-TUBE DETECTOR

H. T. Petersen, OZ7Z, recommends the diagram shown in Fig. 2 for the screen-grid detector circuit. It is another of the family of circuits using a separate tube for regeneration. The screen-grid tube is the detector, while the triode furnishes the regeneration and oscillation. The voltages on the screen-grid detector may be adjusted for maximum sensitivity without making allowance for regeneration control.

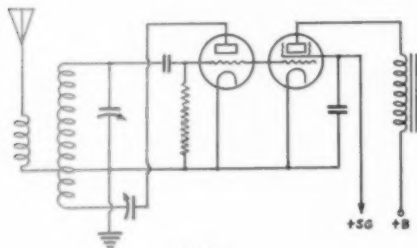


FIG. 2

Likewise the triode circuit may be adjusted for greatest smoothness of control without making concessions for sensitivity.

OZ7Z says the arrangement gives excellent signal strength with a minimum of background noise. The antenna coils should be loosely coupled to the grid coil. The two tubes should, of course, be mounted close together to make the connections short and direct.

THE TYPE '38 AS A SCREEN-GRID DETECTOR

While experimenting with some of the new six-volt tubes, we found that the Type '38 pentode would work very well as a screen-grid detector.

Our receiver was designed to use one of the Type '36 tubes as a detector, but it was found that the pentode would oscillate just as readily as the Type '36 without making any changes in the circuit or voltages.

The '37 probably has no superiority over the '36 in sensitivity as such a detector, but has a lower plate impedance, making it easier to secure a good output load for the tube.

— John Coykendall, W9GKL

AN ANTENNA SUGGESTION

Fig. 3 illustrates the method used by T. S. Shaw, W6AVN, for pulling Zepp feeders tight without putting any strain on the antenna proper.

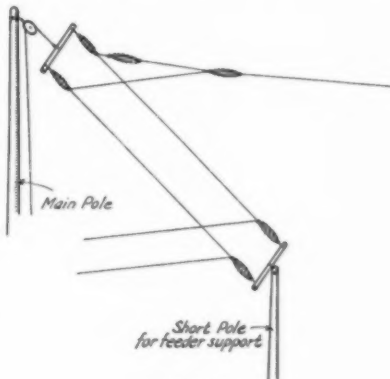


FIG. 3

With taut feeders there is no necessity for a large number of spacers, and the frequency change caused by swinging feeders is largely eliminated.

BREAK-IN WITH CRYSTAL CONTROL

Generally it is impossible to work break-in with a crystal-controlled transmitter because

the oscillator blocks the receiver. To shut off the oscillator manually each time one finishes a sentence is out of the question, but a lag

piece of black cardboard is glued to the top of the completed form a very neat looking choke is the result.

— Tom Wherry, W9GKT

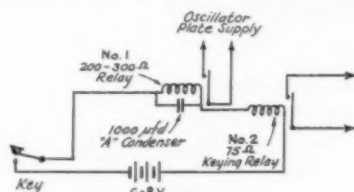


FIG. 4

circuit may be introduced which opens the circuit when the key is open for two or three seconds.

Fig. 4 is a diagram of such a delay circuit, originated by Dick Hilferty, W1AFC. Relay No. 1 should be a 200- or 300-ohm affair, while Relay No. 2 is the ordinary keying relay. The "A" condenser across Relay No. 1 retains enough charge to keep the relay closed during normal keying, but if a more than momentary pause should occur the relay opens. W1AFC uses a sounder with the armature adjusted to rest on the pole pieces of the magnets when in the closed position. The additional magnetic drag helps out in increasing the time-delay.

PLUG-IN RADIO-FREQUENCY CHOKES

In designing the usual crystal rig some provision must be made for the grid chokes to be used in the different stages. Usually these chokes are wired into the circuit by just soldering the wires into place or by using ordinary binding posts. It is very difficult to try different chokes under these circumstances, and a person just uses the choke he has in there rather than go to the bother of changing them. Why not call upon the services of the ever-ready tube base to furnish the material for these chokes?

Scramble-wound chokes are most adaptable to this purpose, but small solenoids also can be used. A wooden dowel whose outside dimensions are slightly smaller than those of the inside of the tube base is grooved so that there are two slots about $\frac{1}{4}$ " in depth and $\frac{1}{4}$ " in width, as in Fig. 5. These slots are wound with the amount of wire desired and the leads led down through the prongs of the tube base and soldered in place. A small hole is drilled through the bottom of the tube base to accommodate a small screw for the purpose of holding the dowel in place. If a round

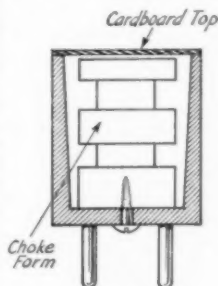


FIG. 5

Starting over again with 714.285 as the super oscillator frequency the points 3571.428, 7142.857 or 14,285.7 may be obtained. By working back and forth many other combinations may be used to get other points. Only a very careful fellow should try it as the harmonic ratio is high.

In using this method the superheterodyne broadcast receiver must be in the same room. The closer the super is to the short-wave set the louder the signal received and the easier it is to get zero beat on the oscillator harmonics. The volume control can be turned all the way down and left there, however. If your super oscillator goes as low as 500 kc. every combination can be reached by working back and forth.

The sets should be warmed up for at least an hour if accuracy is desired, but a half hour will be sufficient for a fairly close check.

— James V. Garland, W2BWR

CUTTING ROUND HOLES IN ALUMINUM

When mounting sub-panel or manufacturer's type sockets in an aluminum-shielded receiver,

the question comes up, "How can I cut a nice round hole in the sheet for mounting socket, tube, etc?"

I have solved this in the following manner:

First procure a pair of heavy carpenter's or machinist's dividers and with one leg drill a hole through till the point just comes through. With this as a center adjust the dividers to the radius of the hole desired and scribe a circle. Make several cuts and then turn the panel over and make several cuts on the reverse side. Open a vise just a trifle larger than the diameter scribed, lay the panel over the opening and strike the inside of the circle several blows with the ball end of a ball peen hammer. Turn over and repeat. Keep turning over till you have lost all confidence in this method, then hit it two or three more times and the inside will drop out, leaving a fine hole with no ragged edges.

— Charles M. Conley, W9CXG-W9CLX

A CHEAP LEVEL INDICATOR

Get a 0-1 or 0-1½ d.c. milliammeter and a Kuprox or some such dry-plate rectifier and take off one disc of the unit. Connect the disc in series with the milliammeter and then across the output of the speech amplifier, as in Fig. 6.

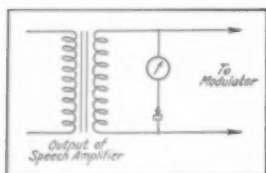


FIG. 6

Possibly a carbundum detector or even a galena crystal would work as well. I have not tried any but the Kuprox unit but no doubt the others would be

satisfactory.

— Jas. R. Donovan, W4WZ-WTOC

SIMPLIFIED TUBE KEYING

The tube-keying arrangements shown in the August Experimenters' Section evidently have proved very effective in a number of stations

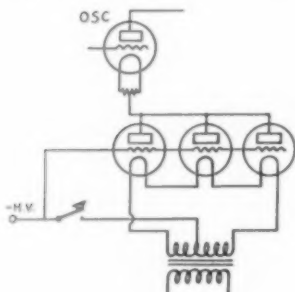


FIG. 7

judging by the letters received. Here is a letter from Karl L. Wagner, W9HVV, who has im-

proved on the original circuits to the extent of reducing the number of parts required to about the very minimum:

"In your recent August issue you gave two diagrams in the Experimenters' Section both of which eliminated key clicks admirably — the elimination being 100% absolute!

"Then I tried the hook-up of Fig. 7, eliminating all bias and condensers and resistances. Again it worked perfectly, there being absolutely no sparking at the key contacts. In effect, this hook-up merely shorts out the bias and opens the circuit of the '45's at another place. As it works equally well without the '45 filament transformer being center-tapped, it resolves itself into merely substituting '45's for the original "c.t. — h.v." points and moving the original "key to c.t." connection to some point on the '45 filament winding.

"In short, instead of keying in the original center-tap, we merely substitute '45's for that and key in the c.t. of the '45's. What could be simpler?"

The Southeastern Division Convention

(Continued from page 45)

ning and the "Big Whoopee Party" and banquet at the Hotel Mayflower. (Yes, fellows, we had to use two hotels for this convention.) Then "Rudy" Mai, W4MF, the whispering Saxophonist, President of the Jacksonville Amateur Radio Operators' Club, was in his glory. He not only saw that the food was good, but he had an aggregation of talent that would have done justice to New York City. After the banquet, Mayor John T. Alsop was introduced by the Master of Ceremonies and formally greeted the delegates; other speakers of the evening were George Stephenson of Miami, who developed the Army-Amateur Net; M. L. Patterson of DeLand, who keeps the net working; A. A. Hebert, A.R.R.L. Fieldman, and Major Van Nostrand, representing the Radio Division, Department of Commerce, who always has a good word to say. After the distribution of prizes, the floor was cleared and dancing enjoyed by every one.

Every one expressed their appreciation to Director Dobbs for his support, and to Randolph Mai and E. M. Winters, who shouldered the responsibility and the other members of the Jax. Radio Club for their assistance in making this convention the best ever held in the Division; and the radio manufacturers are not forgotten for their generous contributions of prizes.

— A. A. II.

BE QUIET!

Be Quiet!

Be Quiet!

During Listening Periods

THE COMMUNICATIONS DEPARTMENT

F. E. Handy, Communications Manager

E. L. Battey, Asst. Coms. Manager

Results ORS QSO Party

THE first of a series of ORS QSO Parties was held from 6 p.m. (local time) October 17th to midnight (local time) October 18th with 121 operators of Official Relay Stations in attendance. These parties are one good reason why it pays to hold an Official Relay Station appointment—Our ORS are the “elite” of amateur operators—you cannot appreciate the full meaning of this until you have attended one of our exclusive ORS QSO Parties and worked a few of the gang. Here's how some of the fellows expressed their opinions: “This party was one of the most interesting affairs of its kind I have ever participated in. Everybody worked voted it a huge success. It is a pleasure to work the other ORS as their signals are clean, their fists easy to copy and their operating snappy. Enjoyed the contacts very much—nice bunch of fellows among the ORS.”

The air fairly “rang” with the call “CQ ORS” during the thirty-hour ORS-contact period. Contest rules were made to make participation in the affair more interesting, and five prizes offered, to the three highest scoring operators in the United States and territories and the two highest scorers in Canadian provinces. Two points were allowed for each ORS contracted, with an additional point for handling traffic (regardless of the amount) while QSO an ORS. One point was granted for each ORS heard. The summation of points was multiplied by the number of A.R.R.L. Sections worked for the final score.

Prize winners are listed below. W8DFE worked 47 stations in 19 sections, handled traffic with 29 of them, and heard 42 other ORS; W6CXW worked 45 in 26 sections, handled traffic with 16, and heard 18 others; W8BTT contacted 22 in 16 sections, handled traffic with 8, and heard 108 others; VE3GT contacted 22 in 13 sections, handled traffic with 15, heard 49 others; VE3ZZ worked 35 in 12 sections, handled traffic with 11, heard 11 others. Good work, OMs. Congratulations! Other ORS who took part in the fun are listed after the prize winners in the order of scores. ORS in forty-two of the total sixty-nine A.R.R.L. Sections submitted scores. Stations whose calls are in italics are the highest scoring stations in their respective Sections. In addition to the stations listed, W8CMP, W8CYG and W1APX were at the Party.

It was an activity in which low-powered stations could hold sway with the best of them. W8APQ, who ranks sixth high in the United States, did all his work with a Type '47 with about 400 volts on the plate. W9ACU had his fun with a '10 with only 225 volts “B” battery supply to the plate. Of the two highest scorers, W8DFE and W6CXW, W6CXW found the 7-mc. band best for contest work, while W8DFE used 3.5 mc. entirely. In view of these facts it may be said that participation was almost equally divided between 3.5 mc. and 7 mc., with perhaps a slight leaning toward 3.5 mc. because of the fact that a great number of traffic handling stations—ORS—ordinarily use that band. Some 14-mc. operation was also reported.

Again, the scores are listed below. Don't you believe that those fellows enjoyed their little party? If you do not hold Official Relay Station appointment, get in touch with your Section Communications Manager at once (see page 5, current QST, for address) for information, and get in line for some of the coming “ORS QSO Parties.”

PRIZE WINNERS

United States

First Prize (1 bound Handbook) — W8DFE, 3465.

Second Prize (1 paper covered HB.) — W6CXW, 3100.
Third Prize (2 log books) — W8BTT, 2560.

Canada

First Prize (1 bound Handbook) — VE3GT, 1404.
Second Prize (2 log books) — VE3ZZ, 1104.

Other 113 contestants in order of scores: W9BWS 2451, W9DGG 2358, W8APQ 2244, W1AFP 2032, W8AKB 1932, W8DED 1872, W3UX 1824, W8DES 1716, W2BPF 1695, W3EV 1600, W9JL 1584, W2AIF 1568, W2BDN 1513, W8BYD 1500, W9FZO 1376, W1IP 1222, W2AIQ-AFP 1212, W1CPG 1183, W8BJO 1079, W9DGS 1034, W8CUG 1014, W9ACU 900, W6GVZ 896, W6WO 876, W9EGI 825, W2WP 816, W9FXE 800, W9JGG 792, W6CAL 780, W2MQ 760, W2ACY 744, W8DIH 711, W8PP 680, W1ASP 660, W6BAM 648, W9BRX 603, W6BJF 572, W1AOK 572, W3BBK 516, W8DDS 496, W1AJD 464, W3AUG 459, W2AGX 441, W6CPF-DLS 392, W9EGE 366, W2BGO 360, W6ATJ 352, W5BPM 352, W8BHK 336, W1BEO 329, W8CFI 328, W3MG 322, VE3IR 318, W6ETJ 315, W9BNN 280, W3MIC 280, W8BMX 276, W2PF 276, W3ADE 276, W9GYO 270, W2BJA 270, W6HS 256, W8BWT 238, W9EAM 228, W9APY 228, W1CFG 228, W9CWG 225, W6LN 224, W8BFA 210, W6YU 205, W9CUH 200, W8BOW-EXP 188, W8BSR 186, W9DMY 175, W3AWV 174, W9DBE 172, W9HMS 170, W1ATX 168, W9GAI 159, W6DZZ 156, W1CTI 133, W2AZV 124, W8DCX 115, W9EJQ 105, W9UM 105, W5ARV 96, W8DBX 90, W3IL 88, W5AEB 80, W4KP 70, W2ANV 69, W1CGX 64, W5BII 51, W9GFL 51, W1BDI 51, W1AAL 47, W9CE 42, W9EDQ 40, W1AWE 40, W4UW 34, W4IF 33, W8CFR 32, W9ESL 21, W9FFD 20, W1WV 20, W8BLH 19, W5GF 16, W9FTX 15, W9DZU 15, W9FWW 11, W9IK 8, W5BOE 5, W6BGF 2.

— E. L. B.

Traffic Briefs

An A.R.R.L. Trunk-Line Network for swift, reliable traffic handling is now being organized. Any operator of an Official Relay Station located in a state capital or other major city is invited to write his Route Manager or Section Communications Manager, if interested in becoming a member of this network. Only thoroughly reliable amateurs who can guarantee to be on the job for each schedule or furnish an alternate need apply. There are still a number of vacancies in the line-up, but they are being filled rapidly. Write your RM or SCM to-day, if you feel you are qualified for a place in these ultra-reliable Trunk Lines!

On November 25, 1931, at 10:55 p.m. E.S.T., W2BPF contacted NEDC, the U.S.S. Hydrographer of the U. S. Coast and Geodetic Survey. NEDC was using a frequency of 3600.6-ke. crystal-controlled, and was located at Norfolk, Va., at time of contact.

Via W6AM we get word from ZL2AC that he heard W6BAX on 28 mc., and that this was the only 28-mc. signal he had heard in many weeks. Who else has some news about 28 mc.?

W3QP thinks we should use QTH instead of QRA when stating our locations, and perhaps he's right. QTH says, “Location by lat. and long. or any other description,” while

QRA says "Name of station." In view of those definitions, **QTH** would be more accurate, would it not?

More than 2500 messages were received at the A.R.R.L. Booth at the 8th Annual Electric-Radio World's Fair held at the Madison Square Garden, New York, from September 21st to 26th. An amateur station was installed in the Garden and operated by members of the Radio Club of Brooklyn and the Bronx Radio Club. The call was W2RU, and operation was on 3900 kc. Much interest was shown by the general public in the handling of traffic. David Talley, W2PF, was chairman of the committee, and W2TI, W2AZV, W2BGK and W2FZ were the others who served as A.R.R.L. spokesmen during the show.

At midnight on February 28th, the Better Station Contest conducted by the Western Radio Communication Society of Philadelphia, Pa., will come to a close, having run from January 1st. The points to be considered in the contest are transmitters, receivers, monitoring and frequency equipment, operating tactics and general good features about the station. For complete information write the secretary of the W.R.C.S., J. W. Callaghan, W3DZ, 719 So. 52nd St., Philadelphia, Pa.

BEGINNERS, NOTE: — Attention is called to the addition of W3AJS, Philadelphia, Pa., to our list of 1750-ke. code practise stations. W3AJS transmits code practise on 1755-ke. (c.e.), Tuesdays and Wednesdays; from 8:00 to 8:30 p.m., E.S.T. Beginners are invited to make full use of this and all other code practise transmissions. A complete list of schedules for 1750-ke. code practise stations will be mailed to anyone requesting same. Address the Communications Department.

Flash!! W1AUY works G2AY on 1750 ke.! And W1AUY was using 'phone! The contact was made at about 2:20 a.m., November 22, 1931. W2BNJ eavesdropped on the QSO and reports G2AY's c.w. signals QSA3 R3-4 here in the States. This is believed to be the first G-W QSO on 1750 ke. in many moons. Who'll be the next to make an international contact on the "ole 160-meter band"?

If, from February 1st to March 1st, you hear any "VE5" calling "CQ MPW," you will know that he is participating in the British Columbia "Miles per Watt" Contest to be sponsored between those dates by the British Columbia Amateur Radio Association. For full particulars, communicate with the club station, VE9AJ, at 2961 5th Ave., East, Vancouver, B. C.

During the month of March the members of the Miami Amateur Radio Club will be engaged in a QSO Contest. Contestants will be judged on the basis of QSL cards received, so all amateurs working Miami stations during the time of the contest are urged to be sure to QSL so that proper credit may be allowed.

A current report received via W9ANG, Liberty, Mo., from Seaton, W3BWL, at the Peru Observatory of the Department Terrestrial Magnetism, Carnegie Institute, was to the effect that he would begin roofing the radio building and auxiliary quarters on September 22nd. He has made up a small transmitter using parts of several old receivers. The Peruvian Government has licensed the Observatory Station for a 150-watt transmitter to be used with the call OA4U on all experimental and amateur bands. Power equipment and the new transmitter are being made ready for shipment from Washington, and it is hoped that installation of the station can be completed by the end of 1931 or no later than early 1932. Amateurs are requested to assist in handling communications from OA4U whenever the opportunity arises.

W4ATN put up a lattice mast with his call letters at the top. It required a Fordson tractor to pull up the mast. Now the tractor is used to pull passing tourists out of the ditch, where they land while trying to read the call letters. Hi.

W2CDJ suggests that we sign "RC" after our CQs, if we wish to "chew the rag." This might help to scare off the "report seekers," who merely say "tnx fer rept cul sk."

Official Broadcasting Stations

(CHANGES AND ADDITIONS)

(Local Standard Time)

W1ABG	7200 kc. Mon., 7:30 p.m.; Wed., 12:45 p.m.; Thurs., 7:30 p.m.; Sat., 12:45 p.m.; Sun., 2:30 p.m.
W1CEK	7024 kc. (cc) Sun., Tues., Thurs., 10:00-11:00 p.m.
W2UL	3608 kc. Thurs., 7:00 p.m.
	7216 kc. Sun., Mon., 7:00 p.m.
W5AOD	Wed., Fri., Sun., 12:15 p.m.
K6FCX	Mon., Fri., 6:00 p.m.
W8AJU	3618 kc. (CW) Mon., Wed., Sat., 7:45 p.m.
W8AVY	3607 kc. (CW) Mon., Wed., Sun., 11:00 p.m.
W8AYU	7050 (cc) Daily, 7:00 p.m.
	14,100 (cc) Sun., 11:00 a.m.
W8BSO	3525 kc. (phone) Tues., Sun., 3:00 p.m.
	3676 kc. (CW) Mon., Fri., 7:30 p.m.
W8DPF	7160 kc. (cc) Mon., Fri., 7:00 p.m.
W9DKN	7160 kc. Mon., Wed., Fri., 7:30 p.m.
W9EKM	3790 kc. Tues., Thurs., Sat., 7:30 p.m.
VE1DQ	14168.4 kc. (cc) (CW & 'phone) Tues., Thurs., Sat., Sun., 10:00 a.m.
VE3GT	3950 kc. Sun., 9:00 a.m.; Tues., Thurs., 7:15 p.m.

BRASS POUNDERS' LEAGUE

Call	Orig.	Del.	Rel.	Total
W9LH	2	4	1987	1993
W3CXL	144	248	991	1383
W8PP	76	67	1147	1290
W8BNT	509	368	394	1271
W7BB	53	162	884	1099
W9FRA	259	75	758	1092
W5VQ	178	50	840	1068
K4IHR	297	227	504	1028
W9JL	462	73	426	961
W9CRJ	913	13	13	939
W8DDS	42	204	678	924
W9EOM	75	22	811	908
W9DKL	34	27	840	901
VE3GT	138	137	611	886
W2BZZ	19	23	804	846
W9EPJ	185	120	502	807
W9HK	149	114	530	793
W8DBX	46	46	652	744
W4AWO	16	19	700	735
W4AOE	512	48	140	700
W6AOA	94	21	579	694
W8BYD	162	170	350	682
W3BWT	110	178	389	677
W3CXM	67	107	491	665
W9EIQ	14	55	587	656
W3WO	51	33	572	656
W9FUT	176	166	308	650
W6SN	27	31	588	646
W6ALU	109	286	204	599
W8DYH	31	74	476	581
W8DMY	115	36	420	571
W8BMG	28	101	441	570
W8BTK	17	7	526	550
W8KY	211	13	320	544
W9CTP	147	60	325	532
W9DI	66	67	398	531
K6AUQ	414	35	72	521
W9WJ	101	67	344	512
W9GAI	301	147	16	464
W9CYT	60	143	232	435
W9BNU	27	106	293	426
W8DFR	69	116	240	425
W9NP	33	312	64	409
W1MK	121	147	137	405
W3AAJ	100	104	164	368
W9YB	141	103	116	354
W8BON	128	102	100	330
W6CVZ	46	104	174	324
W6AMM	113	192	—	305
W5CT	62	117	68	247
W2ADQ	69	140	10	219
W9ETG	47	107	76	230
W8YAU	67	125	14	206
W6HM	85	119	—	204
W9BGW	10	111	40	161
W6FEY	31	129	—	160

Month of November 16th-December 15th. Deliveries count! Note the stations responsible for above hundred deliveries.

A total of 500 or more *bona fide* messages handled and counted in accordance with A.R.R.L. practice, or 100 or more *deliveries* will put you in line for a place in the B.P.L. Why not make more schedules with the reliable stations you hear and take steps to handle the traffic that will qualify you for B.P.L. membership also?

Traffic Summaries

(NOVEMBER-DECEMBER)

	M.P.S.	Total
Central led by Kentucky ¹ (233.7 m.p.a.) (5376)	105.6	28,630
Delta led by Tennessee (30.3) (395)	82.9	2323
Roanoke led by North Carolina ⁷ (109.1) (1201)	78.0	5230
Midwest led by Nebraska ⁹ (187.6) (4128)	75.0	11,332
Atlantic led by Maryland-Delaware-District of Columbia ⁸ (114.9) (2643)	72.6	10,968
Pacific led by Santa Clara Valley (107.5) (1505)	71.8	10,992
West Gulf led by Oklahoma ⁶ (113.7) (1592)	70.7	3962
Ontario	68.2	1775
Dakota led by South Dakota ⁴ (145.0) (1885)	63.7	5226
Northwestern led by Washington (66.7) (2135)	55.4	3270
Hudson led by Eastern New York (80.6) (1774)	51.3	3648
New England led by Maine (88.7) (2485)	51.1	6541
Southeastern led by Eastern Florida (58.7) (1763)	39.9	3678
Rocky Mountain led by Colorado (52.4) (577)	39.2	824
Quebec	32.2	258
Maritime	26.3	73
Prairie	16.6	100
Vanilla	12.6	164
1384 stations originated 21,500; delivered 17,314; relayed 60,180; total 98,994 (80.6% del.) (71.5 m.p.a.)		

This month is outstanding in A.R.R.L. traffic history. Trunk lines are well on the way to complete organization! The total is the highest and the number of traffic reporting stations greatest in the entire history of the present field organization (by Sections) for which records have been kept under the present counting system dating back to 1925. Kentucky wins the banner awarded the leading Section for the best traffic teamwork (M.P.S.) each month, leading the Central Division and the country, and taking the banner which has flown over Ohio for six consecutive months.

Super script numerals indicate the seven "high" Sections in order of their M.P.S. standings. Michigan (123.8 m.p.a.) rates fourth in Section standings and incidentally leads the country on a volumetric basis.

ELECTION NOTICES

To all A.R.R.L. Members residing in the Sections listed below:

(The list gives the Sections, closing date for receipt of nominating petitions for Section Manager, the name of the present incumbent and the date of expiration of his term of office.) This notice supersedes previous notices.

In cases where no valid nominating petitions have been received from A.R.R.L. members residing in the different Sections in response to our previous notices, the closing dates for receipt of nominating petitions are set ahead to the dates given here-with. In the absence of nominating petitions from Members of a Section, the present incumbent continues to hold his official position and carry on the work of the Section subject, of course, to the filing of proper nominating petitions and the holding of an election by ballot or as may be necessary. Petitions must be in Hartford on or before noon of the dates specified.

Due to a resignation in the Northern Minnesota Section, nominating petitions are hereby solicited for the office of Section Communications Manager in this Section and the closing date for receipt of nominations at A.R.R.L. Headquarters is herewith specified as noon, February 16, 1932.

Due to a resignation in the Alabama, Hawaiian and Georgia-South Carolina-Cuba-Isle of Pines-Porto Rico-Virgin Islands Sections, nominating petitions are hereby solicited for the office of Section Communications Manager in these sections and the closing date for receipt of nominations at A.R.R.L. Headquarters is herewith specified as:

Section	Closing Date	Present SCM	Present Term of Office Ends
Quebec*	Jan. 15, 1932	Alphy Blais	Jan. 21, 1932
Louisiana	Jan. 15, 1932	F. M. Watts, Jr.	Jan. 21, 1932
Ga.-S. C.-Cuba-Isle of Pines-Porto Rico-Virgin Islands	Feb. 15, 1932	J. C. Hagler, Jr. (resigned)	.....
Alabama	Mar. 15, 1932	Robert Troy, Jr. (resigned)	.....
Philippines	Feb. 16, 1932	S. M. Mathes	Sept. 28, 1931
Alaska	Feb. 16, 1932	W. B. Wilson	Mar. 28, 1928
Northern Minnesota	Feb. 16, 1932	Raymond Welbe (resigned)	.....
Hawaii	Mar. 15, 1932	L. A. Walworth (resigned)	.....
North Dakota	April 15, 1932	Guy L. Ottinger	April 25, 1932
Nevada	May 5, 1932	Keston L. Ramsey	May 15, 1932
Saskatchewan*	May 5, 1932	W. J. Pickering	May 15, 1932

To all A.R.R.L. Members residing in the Sections listed:

1. You are hereby notified that an election for an A.R.R.L. Section Communications Manager, for the next two-year term of office is about to be held in each of these Sections in accordance with the provisions of By-laws, 5, 6, 7, and 8.

2. The elections will take place in the different Sections immediately after the closing date for receipt of nominating petitions as given opposite the different Sections. The Ballots mailed from Headquarters will list the names of all eligible

* In Canadian Sections nominating petitions for Section Managers must be addressed to Canadian General Manager, Alex Reid, 169 Logan Ave., St. Lambert, Quebec. To be valid such petitions must be filed with him on or before the closing dates named.

candidates nominated for the position by A.R.R.L. members residing in the Sections concerned. Ballots will be mailed to members as of the closing date specified above, for receipt of nominating petitions.

3. Nominating petitions from the Sections named are hereby solicited. Five or more A.R.R.L. members residing in any Section have the privilege of nominating any member of the League as candidate for Section Manager. The following form for nomination is suggested:

(Place and date)

Communications Manager, A.R.R.L.
38 La Salle Road, West Hartford, Conn.

We, the undersigned members of the A.R.R.L. residing in the.....Section of the.....Division hereby nominate.....as candidate for Section Communications Manager for this Section for the next two-year term of office.

(Five or more signatures of A.R.R.L. members are required.) The candidates and five or more signers must be League members in good standing or the petition will be thrown out as invalid. The complete name, address, and station call of the candidate should be included. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of the closing date given for receipt of nominating petitions. There is no limit of the number of petitions that may be filed, but no member shall sign more than one such petition.

4. Members are urged to take initiative immediately, filing petitions for the officials for each Section listed above. This is your opportunity to put the man of your choice in office to carry on the work of the organization in your Section.

— F. E. Handy, Communications Manager

ELECTION RESULTS

Valid petitions nominating a single candidate as Section Manager were filed in a number of Sections on or before the closing dates that had been announced for receipt of such petitions. As provided by our Constitution and By-Laws, when but one candidate is named in one or more valid nominating petitions this candidate shall be declared elected. Accordingly election certificates have been mailed to the following officials, the term of office starting on the date given.

Virginia	R. N. Eubank, W3AAJ	Dec. 15, 1931
Eastern Florida	Ray L. Atkinson, W4NN	Dec. 15, 1931
New Mexico	Jerry Quinn, W5AUW	Dec. 15, 1931

In the Connecticut Section of the New England Division Frederick Ellis, Jr., W1CTI, and Sidney Z. Bear, W1ASP, were nominated. Mr. Ellis received 85 votes and Mr. Bear 40 votes. Mr. Ellis' term of office began December 4th.

In the Washington Section of the Northwestern Division John P. Gruble, W7RT, and William G. Gunston, W7AAE, were nominated. Mr. Gruble received 89 votes and Mr. Gunston 73 votes. Mr. Gruble's term of office began December 18th.

DIVISIONAL REPORTS

ATLANTIC DIVISION

EASTERN PENNSYLVANIA — SCM, Jack Wagener, W3GS — Forty-five stations reported this month. It is the best yet. Let's make it sixty next month. W3MC leads the Section and wins the prize. W3NF claims there is a "repression" in traffic. W3MG ties with W3NF for second place. W3AKB worked several West Coast stations on 3.5 mc. W3OK has installed crystal. W8FCB has earned his ORS. The crystal bug has bitten W3AAD. W3LC reports after a long absence. School QRM is hitting W8CFI hard. W3UX says he is getting too lazy to handle traffic. A type '10 buffer has been installed at W3AHD. W3ZF is still on 1750 kc. W3VB is turning traffic man. W3BBK wants a bug. Chester Radio Club, W3BKQ, send in their usual fine report. W8VD already wants another hamfest. W3NA has rebuilt to MOPA. W8CWO won a frequency measuring certificate. W8AFV reports a new ham in Scranton. W3AFE has taken unto himself a wife. Congratulations. W3AJS reports DX and traffic better on 1750 kc. W3BES says Eastern, Pa., Section should have more room in QST. More reports will do it. The official broadcasts from W3AOJ are heard regularly in Africa. W3BRH prefers traffic to DX. W3BNF has completely rebuilt. W3ATN's new crystal outfit is perking FB. W3BNI does all his work on 1750 kc. W3BTP is going to build a 50-watt crystal controlled transmitter. W3DZ handled all his traffic during Christmas vacation. W3EO reports for first time. W3BNK is out for ORS. W3QP schedules Australia regularly. The first report was received from W8CVS. W8AIT was sick for several days. W3ANZ has a new National receiver. W8DPQ reports many new hams in Kingston. W3UB is on 14-mc. 'phone. W3AQN is very QRL. W3AVI is very much bothered with YL QRM. W3BOL blew his power supply. W3AFG has a lower total than usual. W3BUI sends in his first report. Swarthmore College, W3AJ, has been off the air due to license renewals. W8EU says conditions punk. The Frank-

ford Radio Club held a nice hamfest recently. Reports from all such stations would be very much appreciated and would help the section.

Traffic: W3MC 247, W3NF 227, W3MG 227, W3AKB 194, W3OK 188, W8FCB 174, W3AAD 130, W3LC 117, W8CFI 106, W3UX 104, W3AHD 104, W3ZF 102, W3VB 101, W3BBK 90, W3BKQ 72, W8VD 72, W3NA 47, W8CWO 43, W8AFV 40, W3AFE 39, W3AJS 34, W3BES 29, W3AOJ 29, W3BRH 27, W3BNF 23, W3ATN 21, W3BNI 22, W3BTP 20, W3DZ 20, W3EO 17, W3BNK 16, W3QP 14, W8CVS 12, W8AIT 12, W3ANZ 11, W8DPQ 11, W3UB 10, W3AQN 10, W3AVI 8, W3BOL 7, W3AFG 7, W3BUI 6, W3AJ 2, W8EU 1.

WESTERN PENNSYLVANIA — SCM, R. M. Lloyd, W8CFR — Although W8CUG had the most deliveries and copped the three log books this month, W8DLG had the highest total messages and leads the section. W8DVA has revamped his power supply. W8CUG handled six Transcon messages. W8YA is soon going to be on the 7-mc. band again. W8DKL is getting out with his new crystal rig. W8DZP is going to apply for ORS appointment. W8DGW hopes to join the AARS. W8KD wrecked his crystal; he says W8BNU and W8BSE are still in school. W8CMP is developing a system of complete calibration from WWV's single 5000-ke. standard. W8EDG lost his antenna in the wind. W8AJU is a new OBS. W8CPE reports W8FFH, a new ham in Springdale. W8BUC never sends anything but his traffic total! W8CQA has rebuilt his PA and its power supply. Both W8APQ and W8AYH have YL schedules — and they're over the air, too! W8EIM is back on the air. W8EYZ has a new antenna. W8AJE works ex-W8BRJ who is now W4PI. W8ECH reports the following from Waynesburg: W8DFZ and W8DDU have new receivers; W8CAF has moved to a new QRA in town, and W8FFR works 14 mc. W8AGO expects to open up strong again. W8EEC worked his first station. W8CFR is proud of his Navy Day letter.

Traffic: W8DLG 323, W8DVA 215, W8CUG 205, W8YA 204, W8DKL 126, W8DZP 123, W8DGW 92, W8CMP 79, W8KD 83, W8EDG 74, W8AJU 53, W8CPE 34, W8BUC 31, W8CQA 18, W8APQ 13, W8AYH 13, W8AJE 7, W8EYZ 5, W8ECH 2.

SOUTHERN NEW JERSEY — SCM, Robert Adams, 3rd, W3SM — W3ARN increased his power. W3QL handled some traffic from San Salvador. W3APN sent in his first report. W3JL is working Australia. W3ACJ is helping organize the Ocean City gang. W3BPD is installing crystal control. W3BSC is busy with school. The Atlantic Radio Club members reported in force this month. W3ZI is busy with Army Amateur traffic. W3ADL is active on 7 mc. W3BAQ is building a new 'phone outfit. W3BBD reports a nice total. W3ARV played a game of chess by radio and lost. W3BFH kept several nice schedules. The Radio Association of Southern New Jersey is organizing a 56-mc. Club; all interested get in touch with W3VX. W3SM is adding to the 'phone QRM with a crystal controlled rig. W3BEI has a new receiver. W3SY will soon be on 7 mc. Don't forget the Naval Reserve meetings held in the Armory, Clinton and West Sts., Camden, New Jersey, every Wednesday evening. Drills are held for the New Jersey Section on Sunday mornings at 10:30 a.m.

Traffic: W3BFH 34, W3ARV 20, W3BBD 44, W3ADL 6, W3ZI 61, W3ACX 12, W3BGT 10, W3KY 6, W3UT 6, W3PC 16, W3ATV 8, W3BLR 8, W3ATL 6, W3KY 5, W3AIU 2, W3BSC 6, W3BPD 3, W3ACJ 12, W3JL 36, W3AWT 17, W3APH 53, W3SM 40, W3QL 210, W3ARN 88, W3BAQ 8.

MARYLAND-DELAWARE-DISTRICT OF COLUMBIA — SCM, Harry Ginsberg, W3NY — Activity is moving apace in all parts of "Ye Olde Section." W3BKC, W3BND, W3BAK, W3BGI are four welcome new members of the ORS gang. I wish to extend thanks to the six non-ORS who reported this month: W3HT, W3BII, W3AIS, W3AMI, W3BKE, W3CDG; five of these boys handled traffic. FB! You fellows belong in the ORS line-up. Send in your applications and join the Section's best operators. All reports are welcome, you non-ORS. W3SN won first place for accuracy in the Armistice Day message contest. W3ZK rated high in the late Frequency Measuring Tests.

Congrats to you both for bringing these honors to our Section. W3BAK has a 13-year-old son, a licensed operator, to help keep schedules. Maryland: W3A00 came through with a nice total to lead the Md. gang. W3HT, non-ORS, is coaching several new hams. W3GN's change to new work has held down traffic work. W3ZK is building ultra-accurate frequency measuring equipment. W3BII is having trouble with the power company because of antenna. W3BBW plays checkers by radio with W3A00. W3BGI is building a "pentode" receiver. W3BOE sports two ops, "Ted," and W3BJV, "Al." W3BKC reports for first time as ORS. W3BND changed from T.N.T. to P.P. T.P.T.G. W3AFF is loafing, but is not in love. Hi. W3AHG reported via radio via W3HU. W3BEG is moving his transmitter to a better location. W3CDG is a newcomer to the ranks. W3NY is building a 50 watt T.N.T. job. W3LA returned from N.Y.C. in time to report. W3DG is QRL with radio service work. W3VJ is bucking the Christmas mail rush. W3AMI is on 56 mc. and wants local 56-mc. experimenters to give him a buzz. W3BAT has rebuilt and is on the job as O.O. District of Columbia: W3CXL backs up the Section with a vow of a total to lead the Section. He will have another 1/2-kw. transmitter on 3500 kc. soon. W3BWT got an answer to the Transcon message he originated. W3CDQ's new crystal rig is perking FB. W3BKE is leaving to join the San Francisco gang. 73 and G.B., OM. W3IL is very QRL with work. W3CAB has little spare time for brass-pounding. W3AKR wants a temporary suspension of ORS. Delaware: W3HC helped out on Olympic traffic and Transcons. W3AIS reports lots of activity and rag-chewing around Wilmington. W3BAK is getting started for schedules and traffic. W3ALQ visited the Marine Barracks, Quantico, Va.

Traffic: W3CXL 1383, W3BWT 677, W3A00 114, W3HT 96, W4SN 68, W3BAT 50, W3HC 46, W3ZK 31, W3BII 31, W3AIS 30, W3BBW 21, W3BGI 21, W3BOE 16, W3BKC 12, W3BND 11, W3AFF 8, W3ALQ 7, W3BEG 7, W3CDQ 3, W3NY 3, W3CDG 3, W3BKE 3, W3IL 2.

WESTERN NEW YORK — SCM, Don Farrell, W8DSP — W8CPC works CM8UF regularly on 14,000-ke. 'phone. W8AAC reports that W8IY is now using CW on 7 mc. W8FEJ is still on 3.5 mc. 'phone. W8AAC and W8AVS are working DX on 7 mc. W8ARX is back on the air. W8EXG has push pull '45s. W8EUY is handling traffic. The SCM keeps in close touch with his Route Managers, W8DSS, W8DES, W8QL and W8DME. Please write the SCM if you have any suggestions or criticisms regarding the section. W8BFG is going on 1750-ke. band for 1932. W8DHQ is on 1750 ke. W8AFM is putting in Class "B" modulation. W8DSA will be on 3581 ke. with C.C. starting January 1st. W8DEJ, Marge our YL op., will help operate W8DSA. W8BLP was QSO 20 countries during the month. W8BGN put up a 45-foot telephone pole for antenna. W8QB sticks to 14 mc. W8AED is handling traffic. W8GQ is a new traffic man in Utica. W8CIL wants to get in touch with all hams interested in Esperanto. W8AOW was served with a court order to reveal the contents of a message from B7X. W8CSW wants schedules on 1750 ke. W8BWW has a nice total. W8QL keeps a bunch of schedules. W8DES is doing nice work as R.M. W8DSS, a new R.M., is lining up schedules in eastern part of section. W8DEQ is making some new schedules. W8BLH made a trip to South Carolina. W8CRF reports a new club in Gloversville with over 50 members. W8FMG has applied for ORS. W8EWT has some good Canadian schedules. Let's go, fellows, and put Western New York Section out in front. W8AGS is doubling his traffic monthly. W8DBX leads the section in traffic. W8DXF is active in Army net. W8BHK is changing to high power. W8DHU is a big addition to the section. W8BR is coaching a rifle club. W8ABX is listening on 56 mc. W8DJA is QRL school. W8CMH is still experimenting.

Traffic: W8DBX 744, W8AGS 387, W8DSS 282, W8QL 201, W8DES 124, W8BWW 98, W8DSP 79, W8DHQ 28, W8CPC 23, W8DSA 22, W8ARX 10, W8CSW 9, W8BHK 9, W8AFM 6, W8BLP 6, W8DEQ 5, W8AYU 3, W8BFG 1, W8BLH 1, W8DXF 144, W8EWT 121, W8AED 83, W8CJJ 58, W8BFF 53, W8EUY 31, W8GQ 30, W8AAC 27, W8AKC 26, W8FMG 23, W8EMW 11, W8DPF 11, W8DHU 324, W8CJJ 58, W8DMJ 32, W8CMH 12, W8EIJ 8, W8DJA 10, W8ABX 5, W8BR 4, W8DRZ 4.

CENTRAL DIVISION

KENTUCKY — SCM, J. B. Wathen, III, W9BAZ — Record traffic total for our Section — 5376 this month. Due mainly to Lexington activity. An All-KY 'phone net is now working Sun. afternoons 3.5 kc. You 'phones who haven't participated, write W9ETD for details. The N.K.R.A. held a Hamfest which was a "WOW"! Those who missed "Peach Fuzz" —, oh well, you should have been there. All for \$1.89. W9LH shatters all Section (KY) records with 1993 total. Competition for Mackay Radio. W9JL has a fine total and a new Esco. W9CRJ required rebuilding after his big month. W9EOM replaced his '10 with an '03A. The reason W9BWJ punches such holes in the air — he's an oil-well driller. W9BAZ wants the mate to the heel he got at the aforesaid Hamfest. W9EDQ now has two '10s in TNT. Until he gets larger plate supply, W9QT will continue to get only 85 watts from his 1-KW tube. We wonder if Santa brought W9BBO that needed filter? W9ARU spent winter vacation in Miami, Fla. W9BAN is getting Western Ky. cooperating. DX still in vogue with W9DDQ. W9GON is installed in new QRA. The bunnies put their mark on W9EQO — he got "rabbit fever." W9BPB has separate transmitters on 14, 7 and 3.5 mc. W9HAX has two transmitters now, on 7 and 3.5 mc. W9VB is an old-timer with a new call, in Lexington. W9ABV is progressing. W9FZV has a depression in news. Experimenting takes all W9AEN's time. W9CWZ reports his new crystal 'phone on soon. W9AYH is now permanently on 7015. The new transmitter at W9EYW should be going by now. W9HCO is getting out well on 'phone. Those who are bothered with QRM should try 1750-kc. band.

Traffic: W9LH 1993, W9JL 961, W9CRJ 939, W9EOM 908, W9BWJ 168, W9BAZ 112, W9EDQ 82, W9QT 45, W9BBO 26, W9CNE 20, W9ARU 15, W9BAN 11, W9DDQ 9, W9GON 9, W9EQO 8, W9BPB 6, W9HAX 6, W9VB 6, W9ABV 5, W9FZV 4, W9AEN 2, W9CWZ 2, W9HCO 2, W9OX 37.

INDIANA — SCM, George H. Graue, W9BKJ — W9FUT piles up the largest total in many months. W9YB at Purdue is knocking off the traffic splendidly. W9TE is doing a good job as Route Manager, and handling good traffic. W9EGE is still remodeling shack. W9BUI is the club station at Mitchell. W9FHB's rectobulbs went haywire. W9EPT is a new station at Oolitic. W3ASL has moved to Elkhart and has applied for a W9'. W9AOY and W9DXH are new hams. W9BQH has changed to sepp antenna. W9AKJ is going FB with the new crystal rig. W9DVE is trying his luck at grinding crystals. Ex 9ABP is getting the fever again. W9DUJ is making a dynatron freq. meter. W9CAR reports for the first time. W9GFS and W9DJP are newcomers at Evansville. W9CHA boasts of working a YL op recently. W9HTP reports handling his first traffic. W9GHF is another new one at Gas City. W9FKE is asking visiting hams to autograph the panel on the transmitter. W9DRS after being inactive for three years has made a comeback. W9AXH has installed a pair of '72s. W9HIU is worrying about a key click filter. W9ABW has several schedules working FB. W9DHJ wants to work more Ind. stations. W9QG has worked Europe on 3.5 mc. W9TE is holding down ten schedules. W9HUO wants an ORS ticket. W9CKY has an '04A going on 7 mc. W9FCX is on again. W9GOE is getting out FB on 'phone. Ditto for W9LG. W9FSG is doing a Rip Van Winkle. W9AB is working 1750-kc. 'phone giving code instructions for beginners. W9BWI is actually transmitting TELEVISION on 1847 kc. W9BXT reports for the first time, same for W9FKI. W9BDE is working DX à la low power 'phone. W9EXL and W9BOS are new ORS.

Traffic: W9FUT 650, W9YB 354, W9TE 242, W9QG 83, W9DHJ 68, W9BKJ 59, W9ABW 48, W9AKJ 36, W9FYB 23, W9HIU 21, W9GJS 17, W9FQ 16, W9AXH 12, W9AIP 10, W9FKE 21, W9HTP 9, W9CHA 2, W9EXL 1, W9DJU 6, W9EPT 2.

ILLINOIS — SCM, F. J. Hinds, W9APY — RM, W9ERU, E. A. Hubbell. A fine month, OMs. Plenty of activity. But let's have more traffic. W9WJ had the misfortune to break his left arm. W9KB issuing a Type '10 in push-pull. W9CKM is coming to the front. So is W9AMO. W9BYZ had troubles with the antenna. W9CEO is a new reporting

station. W9FTX reports open house for schedules. W9DZG is now crystal-controlled. W9AFN was elected sec.-treas. of South Town Radio Amateur Club. W9VS suggests the slogan "Get the Habit — RADIO — Why Mail?" Another new man is W9HZB. W9BVP got rid of the key clicks by removing the key click filter. Hi. W9FCW is consistent with traffic and schedules. W9GDI has a brand new monitor. W9ACU says we are going better and better. W9ACE wants to know when there will be some more contests. W9FXE has a new 3500-ke. sepp. W9AVP is building the sets into a walnut cabinet. A banner month for W9GFU in traffic. W9AFB is using an '03A and 211E in a PP circuit. W9CZL says weather poor for radio. W9HFK says his gang is not going to sleep any longer and let another section beat us. Several filter condensers at W9FPN decided to retire permanently. W9QI did fine work with a 24-hour relay on China-Philippine traffic. W9AIC wants schedules. W9GJJ may be found on 7000-ke. band. W9CUX does fine traffic work in between classes at school. Highest honors this month go to W9FRA of Chicago — look at his totals. The new crystal outfit as per November QST is doing fine at W9GAI. W9BRX has been experimenting with 3.5-mc. 'phone. W9FGN is quitting DX to help us get things started here in Illinois in the traffic way. FB. W9CNY did good work in the Navy Day programs. W9FGD says the old faithful '10 "DX" tube went west. Hurrah, W9DZU is back again — watch his totals. W9FDQ has been working on the MOPA. W9EUU has come out of hibernation. W9AND will soon be a new ORS. Our consolidated stations W9FO and W9ENH are doing excellent traffic work with the help of W9HGC. W9DOU is going to give 7000 a trial. W9AD is hungry for traffic. W9BIR is making repairs in the house between messages. W9DOU is now an extra first. W9ABF has 2 '45s in push-pull. We are mighty pleased to see W9HPK reporting his traffic. W9FYZ is getting on more now. W9HUX uses two '26s in push-pull TPTG. W9ANR tells us his enlistment is about up and is QRD California. W9CGV is handling good traffic. W9JO is proud possessor of a new 42-foot mast, a new power supply and a brand-new bouncing baby girl. Congratulations, OM. W9EKM wound a new plate transformer. W9FAU is using '45s in push-pull TNT. See W9DZM about crystals. Old W9DJ is with us again under W9GSY. W9CCB has left us and will soon take up his abode again as K4KD. W9AYO is doing fine work — thanks to cooperation with W9BPU. W9GDM went to 3500 kc. W9BEF is experimenting with the higher frequencies in 'phone. A new Zepp has taken the place of the Hertz at W9BYL. W9GVU has a new 50-watt crystal. W9BRY has a '52. W9ERU is rebuilding between schedules. W9HVO works Cuba and all around with his flea power as does W9HYI. There is a fine PP TNT '01A outfit on 56-mc. 'phone, and doing nicely, at W9EAL. W9AAV is on with a '71A. W9ANQ is on between classes. W9BBR rebuilt the 'phone job. W9BJH has an MOPA going nicely. W9CNQ is on both CW and 'phone. W9CGW is an old commercial op. W9BLV has the receiver going well. W9DEU is on again. W9DXK is also on after a rest. The OW gave W9EPQ some tubes and meters for Christmas. W9EYI is on 7000 afternoons. At last W9EPU has completed the new receiver and transmitter. W9EGY has a motto — "The station located where the world is flat." W9GYK has two new 212Ds. New officers of Waukegan Radio Club — W9ANA, president; W9CUH, vice-president; W9GIG, secretary; W9DEU, treasurer; Frank Nuttill, sergeant-at-arms.

Traffic: W9FRA 1092, W9CTP 532, W9WJ 512, W9GAI 464, W9CYT 435, W9ACU 425, W9FXE 376, W9ERU 268, W9AMO 266, W9FAU 242, W9IU 216, W9QI 209, W9AFN 203, W9FO 147, W9FCW 146, W9ANR 139, W9WR 134, W9GFU 133, W9DDE 121, W9APY 107, W9CUX 88, W9CGV 73, W9BVP 64, W9VS 64, W9DZM 57, W9AND 50, W9BPU 50, W9EKM 49, W9CZL 48, W9DBE 48, W9HZB 44, W9DOU 36, W9ACE 32, W9HFK 31, W9AD 28, W8BYZ 28, W9DZU 28, W9AYO 26, W9AFB 24, W9DGM 23, W9FHJ 20, W9HPK 19, W9CEO 18, W9CKM 17, W9EUU 15, W9AIC 12, W9FGN 12, W9FTX 10, W9JO 10, W9CUH 9, W9FGD 9, W9AVB 8, W9FYZ 7, W9GKV 7, W9BIR 6, W9BRX 6, W9DZG 6, W9CNY 5, W9KB 5, W9FDQ 4, W9BYL 3, W9GDI 3.

W9GES 3, W9HVO 2, W9CPE 1, W9ECR 1, W9FPN 1, W9GRX 1, W9CFV 2, W9QCF 48.

MICHIGAN — SCM, Ralph J. Stephenson, W8DMS — W8PP again heads the list with W9HK hot after him. You fellows beat all Michigan records with 77 stations reporting this time, for nearly 8500 messages. FB. W8PP is working one day a week so plenty of time for QSP. W9HK was a Detroit visitor over Christmas. Between W9GJX and W9HK the "nines" are beginning to be among those present; 17 of 'em this month. W8DYH still finds time away from W8DZ to handle a few at home. W8KY with four ops. is back in the old WYE stride again. W8AM was laid up for a while. W8BTK keeps Wayne on the map and "forces" W8AJG to send in his score too. W8FX graduated his student, W8BIU, and is now looking for another. W8CTV bewails the unreliability of 7 me. for schedules. W9HSQ does his rag chewing by 'phone. W8DNT found his last report card in his dad's pocket. W8SH has four student ops. W8EGI keeps fine bunch of schedules. W8WR is QRL new job. W8BJ is at WCK, Detroit Police Station. W8AYO, W8AKN and W8PQ are up for ORS appointments. W8EVC is also due for it soon. W8EKZ reports plenty activity around Kalamazoo. W8BXJ is experimenting on 56 mc. W9EXT, W9EGF and W9YX keep traffic moving in "copper country," and with W9CWR in Ironwood and W9CE in Ishpeming, the northern portion of upper Mich. is well taken care of. W9GJX, W9BBP and W9VL take good care of the southern portion of the peninsula. W8DEH proudly displays a beauty of a radiator. W8BWJ is another "teacher" with two students. W8COW and W8CAT are both heard frequently with FB sigs. Neither sounds like "MOO" or "Meow." W8GP, W8LU, W8AW and W8DMS all are possessors of certificates of accuracy from the F.M.T. W8DFS plugs along for the West side of the state. W9ANT grabs his score in one day. W8MV (Frank) is building up a new outfit. W8CLL says he's gone "foney." W9CWR picks up W9ADY's report. W9YX solved "key elix" troubles by tube keying. W8LU has new QRA. W8DED still keeps the fellows pepped up. W8EAE and W8BV report by proxy through DED. W8AKN is still running on the momentum gained at Legion Conv. W8JZ only has input of 750 watts on 2 '04As and is trying for the extra 250 watts. W8AKN was QSO all districts on 3.5 mc. in 2 hours. W8DXY plans to go to Florida for the winter. W8AZQ is ready for traffic. W8DM starts reporting after 8 years. W9VL relays reports from Gladstone bunch. W9FSK is a newcomer in Escanaba. W8AUT is trying to schedule Porto Rico. W8RP pops up with a few this month. W8CU has his "hamfest" 50-watter disarranging the electrons now. W8BGY keeps us represented in Lansing. W8CPH is working for his ORS cert. W8ABH reports his first total. W8CEU promises a few next month. W8RF handles messages and chews the rag. W8CST is expecting QRM with another ham starting up in his block. W8JX is about stopped by QRM. W8CFZ is rattling the Baldies with c.e. W8DZ gets "88s" messages via W8DYH. Several of the gang helped the SCM hang up the 50-footer at the new QRA. (See page 5.) W8BMZ and W8BWB are both using crystal now. The Chair Warmer's Club, W8BRS secretary, held a party at Detroit Masonic Temple. The D.A.R.A. promises plenty of activity this year with a three-man entertainment committee. The University Radio Club at Ann Arbor is showing lots of pep and is open to all amateurs. They have plenty of speaker-material in the University Engineering staff and their meetings are certainly worth while.

Traffic: W8PP 1290, W9HK 793, W8DYH 581, W8BMG 570, W8BTK 550, W8KY 544, W8EGI 339, W8AM 315, W8AKN 310, W8FX 286, W8DED 242, W8DFE 214, W9VL 198, W8EKZ 167, W8AW 125, W8GP 119, W9EGF 110, W9CE 108, W9EXT 107, W9GJX 106, W9CWR 100, W9YX 94, W9BBP 84, W8CAT 71, W8RF 70, W8PQ 69, W8AJG 65, W8DZ 62, W8EVC 59, W8DFS 58, W8CFZ 57, W8DEH 53, W8CST 49, W9CSI 40, W8BXJ 36, W8RP 35, W8COW 30, W8BGY 25, W8DOV 23, W8DMS 21, W8JZ 17, W8CTV 17, W8CLL 17, W8AZQ 16, W8JL 16, W8WR 16, W8BWJ 16, W8AJL 15, W8AYO 13, W8CWK 12, W8CPH 11, W9ANT 11, W9FSK 6, W8DM 6, W8SH 6, W8EGX 5, W8CJZ 5, W8BWB 6, W8ABH 5, W8BIU

4, W8AUT 4, W9HBR 4, W9ADY 4, W9FPF 4, W8BUH 4, W9HIS 3, W8EAE 3, W8DNT 1.

OHIO — SCM, Harry A. Tummonds, W8BAH — Happy days are here again. We're all through rebuilding in Ohio and everybody is all set to go. And we are dog-gone proud of our 88.2% deliveries this month. In the BPL this month we find W8DDS and W8BYD. District No. 1: W8BON is filling out ORS application. We welcome W8ENJ of Sandusky as a new reporter. W8BMX tests boilers. W8BNC has new portable call. W8ZZK. W8EBT says W8DDS schedules a certain party by U. S. mail and the telephone. RM W8DVL has new receiver. W8CTP applies for ORS. W8CCK says used S.F. Sigs from W1XP to calibrate new monitor. W8CUW promises to do better. W8DXD has a new '03A. W8DYG is lining up for American Legion Nets. We welcome the first report from W8DGV. W8CIO received a certificate in the Frequency Measuring Contest. Congratulations to W8BYD on leading the BPL last month. W8RN wants a job. W8EFW worked W6CLP with an '01A with 135 volts. W8FJE is on the air every day 8 to 5 p.m. W8FF has a Push-Pull Hartley. W8EBY wants more vacation from school. If you live near Cleveland, or even Los Angeles, and your receiver is blocked, it's probably W8EXA. "Still looking for schedules," says W8EQU. W8AGF says, "All I need now is a receiver, transmitter, power supply, etc." W8AXV received his "A.R.R.L. Expedition or Public Service Certificate" and also won second place in the Ninth Naval District and received his letter from the Navy Department as one of the 25 men so honored. W8FFM is putting in an '03A tube. W8DDS. G.O. RM., was busy with Christmas traffic. W8EEW says W8CHB is back on air. "Almost of the air due to my radio business picking up," reports W8DIH. District No. 2: W8CEI has six schedules. We would like to have reports from W8JC. Youngstown is on the air now. We have report from W8AQX. W8BKM again this year wins first place in the Ninth Naval District, and a letter from the Navy Department, in the Navy Day Broadcasts. W8BCI is recovering from an operation. District No. 3: W8BTT does better this month. W8CSB says weather conditions terrible. RM W8APC still craves Crystal DC. Nice report from W8AND. District No. 4: W8QC is a new ORS. W8QC is the new call of W8ADS. W8HT uses low power. W8EEQ is night clerk at the Phoenix Hotel in Findlay. New outfit "mighty but little," reports W8CXN. W8OQ had his ORS renewed. "No BCL QRM now and all set," reports W8DTW. District No. 5: W8BZL will soon have the new O.N. Guard transmitter on the air in Akron. W8BSR says little time on air. W8EFN says W8DUD is making new transmitter. W8DVE is still working on new crystal rig. RM W8DFR says sickness and QSC pulled total down this month. District No. 6: Windy reports for W8GZ. "Trying to work pair '52s in push-pull," says W8SG. W8CXF reports regularly. RM W8NCM is working hard for his district. "Busy with Service work and putting in Crystal," says W8BBH. "Rebuilding," reports W8ARW. District No. 7: W8VP sends in a nice total. RM W8CKX says enough trouble for six guys with this crystal. W8ANS is a new reporter from Bellairs. District No. 8: RM W8CGS renews ORS. W8ENH is rebuilding. Second report from W8ALQ at Cincinnati. We also hear that W8DMG, exW6BQ, former SCM Arizona Section, is now in Cincinnati. 'Phone RM W8CUL holds many fine 'phone schedules. W8EDY reports. W8FA has been on 56 mc. District No. 9: "Batteries are haywire," reports W8TK. W8DUD reports by radio. "A '10 in TNT Circuit," reports W8EQB at Caldwell. Get all set for that new DC crystal rig at W8BAH, on the air by next report. The Shaker Heights Amateur Radio Club holds regular weekly meetings at 2699 Endicott Ave., Shaker Heights officers are W8DJK, president; W8EIW, vice-president; W8CNS, secretary; W8HC, treasurer.

Traffic: W8DDS 924, W8BYD 682, W8DFR 425, W8BON 330, W8EFN 185, W8DVE 159, W8NCM 142, W8CEI 134, W8FF 122, W8GZ 120, W8BMX 106, W8DYG 94, W8BAH 80, W8CIO 81, W8APC 81, W8CUL 74, W8EDY 65, W8BNC 65, W8BKM 64, W8DVL 60, W8VP 51, W8DGV 49, W8OQ 44, W8DTW 44, W8EQU 44, W8AXV 43, W8BBH 36, W8EEW 35, W8CIV 33, W8CXN 32, W8FQB 28, W8EBT 28, W8EEQ 25, W8ANS

23, W8CKX 21, W9BZL 20, W8TK 19, W8EXA 19, W8SG 18, W8ARW 17, W8CXF 16, W8DUV 15, W8HT 14, W8QC 13, W8ALQ 12, W8BTT 10, W8AQX 10, W8CSB 9, W8EBY 9, W8CCK 9, W8AGF 8, W8FJE 7, W8ENH 7, W8AND 6, W8ENJ 4, W8FA 4, W8OQ 3, W8BSR 2, W8EFW 2, W8CGS 2, W8CTP 1.

WISCONSIN — SCM, C. N. Crapo, W9VD — W9GFL schedules all directions. W9FAA has schedules with W9ANR, W9GPQ and W9EPJ. W9EHD was credited with an accuracy of 99.96% in the Frequency measuring contest. W9DKH handled 28 messages in the Transcon. W9EBO is the call of the Burlington Amateur Radio Club. W9ZY-W9AZN works best in daylight. W9FAV is doing good work as President of the Badger Amateur Radio Club. W9FHU — W9FGX reports from Wausau. W9FAW attended N.W.R.C. meeting recently. W9EGP sent a report of all stations in Stevens Point. W9DND is now CC. W9FVG is on 3500 kc. W9DTK is remote controlled. W9DJQ has a '10 in TNT. W9AVG is busy grinding crystals. W9GVL chopped 10 feet off his antenna. W9BXZ has a pair of '10s in PP. W9FSS says it's pretty cold up in the attic these days. W9AN wants schedule with Milwaukee. W9ABM schedules W9EGP and W9FGX. W9CFP blew filter. W9ESZ is back again with 50 watts crystal. W9DLQ will have the crystal set perking soon. W9HMS has new receiver as per December QST. W9EOB is blocking all the receivers in his neighborhood. W9DRO sends his first report from Lacrosse. W9BWZ will be on with crystal first of the year. W9ASQ sends the dope on the Superior hams. W9AGC will soon apply for ORS. W9DBP is a new station in Beloit. W9VD has a 3500-ke. Zepp that is the best ever. W9GPQ has schedules with W9BN, W9FAA and W9EPJ. W9ANJ reports via his RM. W9COG reports via W9FAV.

Traffic: W9GFL 210, W9EHD 126, W9DKH 67, W9EBO 57, W9FHU 30, W9FAV 51, W9COG 8, W9DRO 1, W9ANJ 9, W9ZY-AZN 59, W9FAA 165, W9GPQ 15, W9FAW 29, W9EGP 20, W9DND 20, W9DTK 18, W9DJQ 17, W9GVL 17, W9BXZ 16, W9FSS 13, W9AN 13, W9ABM 11, W9CFP 10, W9ESZ 6, W9DLQ 4, W9HMS 2, W9EOB 2, W9DRO 1, W9VD 38.

DAKOTA DIVISION

SOUTHERN MINNESOTA — SCM, H. Radloff, W9AIR — Interest in the Inter-Sectional Traffic Competition is white hot. W9BNN is winner of the Handbook this month. Inadvertently omitted, W9BN must be credited as winner last month. W9EPJ is far in the lead with a flock of schedules. W9BKK delivered important traffic to the mayor of his town. W9BKK annexed another '52. W9DGE reports W9HXS and W8BET as locating in Minneapolis. The Minneapolis Radio Club, with 53 members, meets at Dunwoody Institute first Thursday of every month. Visiting hams welcome. W9HRH applies for ORS. W9COS greatly enjoyed the Transcons. W9CKU had a night of good DX while W9BMJ visited there. W9ERT dispenses code practice. A QSL from Siberia for W9LS. W9FAD handled Army Amateur traffic. W9FNK reports W9DEI a new ham in Rochester. W9FJK now has crystal. A commercial ticket is the ambition of W9FFY. W9HCW is up and coming. W9HFF is busy with club matters. W9FUI ironed out his transmitter difficulties. 100 watts oscillating at W9DRG. W9FCS ops. on 3.5- and 14-mc. bands. W9HXR reports W9HXV, W9HZU, W9CTB new Minneapolis hams. W9GUX experiments. W9EGG, ol' ¾ doz. of lo-power fame, is active again. W9EFW is new ham at Winona. W9AKN was very active during vacation. W9EYL notes vagaries of the frequencies. 3.5-mc. band satisfies W9DBC. 7 and 14 mc. for W9HOP. W9DGH hooked a bit of DX. W9BTW is also DX hunting. W9GFA is new call at Rochester. W9AQH has a temperature control on his crystal. W9YC is on 1750 kc. for A-A work. W9EPD is a new ORS. W9EAT moved to 1750 kc. to combat skip. W9EEB and W9FLE rebuilt their 'phones. The R. I. awarded W9DRK and W9EJZ Amateur First tickets. W9EYS' cornet toots a mean CQ in an orchestra. W9GHP puts the 75 watter on the air at W9ACB, South High School in Minneapolis. W9ATP is a new call at LeSeuer.

Traffic: W9EPJ 807, W9BNN 314, W9BN 264, W9BKK 120, W9BKK 70, W9DGE 57, W9HRH 55, W9COS 49,

W9CKU 31, W9ERT 29, W9LS 21, W9FAD 21, W9FNK 18, W9FJK 13, W9FFY 11, W9HCW 11, W9HFF 10, W9DRG 9, W9FCS 8, W9EAT 7, W9HXR 6, W9GUX 5, W9AIR 3, W9EGG 2, W9ATP 1, W9AKN 1, W9EYL 2, W9DBC 2, W9HOP 2, W9DGH 2, W9AQH 1, W9GFA 1. (W9HCC, 20. November)

SOUTH DAKOTA — Acting SCM, Stanway Gough, W9DNS — W9DKL takes the honors this month and makes the BPL again. The Radio Show at Sioux Falls helped make some good totals there. W9FLI, W9HHW, and W9ALO put up new antennas. W9GMF increased power on his 'phone to 500 watts. A certificate of accuracy in the frequency measuring test was received by W9ALO. W9CPB now has a TNT using two '50s in P.P. W9CFU is learning to fly. W9EDX is again on the air. W9FDD is a new ham at Brookings. The R. I. visited Aberdeen and Watertown. W9DKL and W9DB passed Amateur Extra First; eleven others passed the Amateur Class. A new ham in Sioux Falls fell and broke his arm and the next day got the call W9CRY. W9FJZ is using 180 volts on Type '12 tubes. W9DIY built up a nice crystal rig. W9DNS took a week off while his station license was being renewed. Watch the dates on those licenses, fellows. W9BLZ got better reports on 7½ watts than he did with his 500 so decided it was time to rebuild. W9BJV likes his new Nat'l AC-SW-3. If you aren't in the S.D. traffic contest, write W9DKL for details. W9AQB just gets under the wire with his report.

Traffic: W9DKL 901, W9FLI 346, W9BLZ 241, W9DNS 195, W9HZZ 131, W9BJV 35, W9ALO 13, W9HSH 4, W9CFU 3, W9AJP 2, W9HHW 2, W9DTZ 1, W9AQB 11.

NORTH DAKOTA — SCM, Guy L. Ottinger, W9BVF — This is a banner month for the N. Dak. Section. 10 stations reported and lots more are active. W9HJC and W9BAY are now OBS. W9AOX at WDAY is N. Dak. 0.0. now. W9CRL's license expired. W9DGS is organizing state ALN. W9IK handled 38 messages on 'phone. W9BMR, W9DM, W9IK, W9EGI, and W9DYA all have schedules. FB. W9DFF is new ORS. W9DM and W9DFG were in Jamestown for Christmas. W9BVF is dabbling with 3.5 mc. 'phone. The Dakota Amateur Radio News is put out by the Fargo gang, edited by W9DOY. W9BAY and W9HJC are new ORS. W9FMC is rebuilding receiver.

Traffic: W9DGS 413, W9CRL 69, W9BVF 52, W9IK 38, W9DYA 29, W9BMR 81, W9EGI 23, W9EIG 18, W9DM 12, W9FMC 6, W9DFF 5, W9HJC 85, W9DOY 28, W9EVQ 6, W9FCA 24.

NORTHERN MINNESOTA — SCM, Ray H. Weihe, W9CTW — W9BRA wins the third Handbook in the inter-sectional contest. Congrats, OM. A new ORS, W9EOZ, has a good total. W9CTW has sent in his resignation as SCM. W9ARE has been on a vacation. W9BBL reports 3500 kc. very freaky. W9DOQ reports several new stations in Duluth. The annual Christmas party of the ARA was held at his place. W9HIE is helping to get the boys reporting their traffic. W9EGU and W9AH report via radio. W9GCZ is using a 211 with 190 watts input. W9HZM says "nix." W9BVM wants to become an ORS. W9HEN is a member of the "Barnyard Club." Hi. W9HDN did some fine relief work, handling some emergency traffic, and deserves a lot of credit. W9HFX sends in his first report. W9HRB reports interference from local police station. W9HNS wants to go in for traffic. W9CWI cancels his ORS on account of QRL.

Traffic: W9BRA 123, W9EOZ 75, W9CTW 51, W9ARE 46, W9BBL 36, W9DOQ 21, W9HIE 20, W9EGU 19, W9AH 15, W9GCZ 16, W9HZM 14, W9BVM 13, W9HEN 12, W9HDN 11, W9FNQ 5, W9HFX 5, W9HRB 3, W9HNS 3, W9FNJ 1, W9CWI 2, W9BVI 5, W9GKO 3.

DELTA DIVISION

MISSISSIPPI — SCM, William G. Bodker, W5AZV — Our new RM, W5ANX of Pickets, turns in the fine total of 365 making the BPL by a good margin; most of this traffic was handled on 3500 kc. 'phone. W5ANI has a new push-pull TNT on 3500 kc. W5AZV has rebuilt entirely. W5BZG of Holly Bluff reports for the first time. Two new stations in Vicksburg are W5AGZ and W5AYI. W5BUI is back on the air. W5AAY has applied for ORS. W5BEV has a crystal-control 3500-ke. 'phone. W5ID, the OO of Mississippi, missed the frequency measuring contest on account of

receiver trouble. W6ANX is organizing a 'phone net for Army Amateur system. All Miss. 'phone stations interested are requested to get in touch with W5ANX.

Traffic: W5ANX 365, W5BZG 22.

ARKANSAS — SCM, Henry E. Velte, W5ABI — W5BMI hands in the best traffic total. W5IQ is kept busy by AA work. W5BNH at Fayetteville reports for the first time. W5CR has a regular schedule with W9EYG back in the old home town. W5FM reports that he is on C.W. 100 per cent. W5JK reports that he is junking his Chemical rectifier and replacing it with a pair of '81s. W5BKB now has his license back. W5HN will be on soon. Let's hear from everyone next month.

Traffic: W5BMI 421, W5IQ 394, W5BNH 390, W5CR 107, W5FM 16, W5JK 10.

LOUISIANA — SCM, Frank Watts, Jr., W5WF — Let's make this old section ring with traffic and genuine amateur interest now and get going. W5BPL reports for New Orleans. W5HR is handling lots of 'phone traffic. W5AFJ has returned to Comanche, Texas. W5KC ays W5AAT and W5AKH are new QRMers there. W5BUK will be going strong by the time this report comes out. W5AKT reports traffic. W5AXU reports for Alexandria. W5ANQ is still rebuilding. W5BFP is not handling much traffic. W5AXD is building more conglomeration to his rig. W5RRR reports occasionally. W5ASJ has been chirping some. W5BJA is silent for some reason. W5BYV and W5BYQ are still kicking. W5AYZ will soon be on with a FB rig. Where are W5EB, W5FR, W5BDJ and W5CAX? W5WF will be back on looking for traffic soon. Come on, every one, let's get started and boost ole Louisiana.

Traffic: W5KC 4, W5BPL 49, W5HR 58, W5BUK 16, W5AKT 10, W5AXU 15, W5WF 51.

TENNESSEE — SCM, James B. Witt, W4SP — W4OI leads in traffic again this month. W4RO made the Navy Day Honor Roll. W4GX expects to have a 50 watter going soon. W4AFM sent in FB report. A radio club has been organized at Jackson "I Tappa Key Club" — and has 14 licensed amateurs as members; W4PV, pres.; W4AJJ, v. pres.; W4FA, secty., and W4AMH, treas. W4AMH is on 3.5 mc. with CC. W4AQV is building transmitter for National Guard. W4AJJ is working DX on 7 mc. W4AXN and W4HL are rebuilding. W4ASC is on 3.5-mc. 'phone. W4JG, W4AWW and W4AFI are on 3.5 mc. CW. W4UU is Broadcast engineer at WTJS. W4WU is YLing. W4FA has new 212D. W4ANC is announcing for WTJS. W4AHD is having trouble with hum in new AC receiver. W4LQ has resigned as NCS in Tenn. AA 'phone net. W4LU is working both 'phone and CW. W4AJA is working at BC station in Ky. W4AD would like to hear from any of the gang that can make Class B Modulation work. W4TM is working 14 mc. 'phone and 7 mc. CW. W4ACU has moved to Memphis. W4ASU has a FB 15 watt 'phone going. W4AAD has been doing fine work as OBS. W4TM, W4ABY and W4AXN attended the Southern Amateur Radio Association held at Shelby, Miss.

Traffic: W4OI 110, W4GX 55, W4RO 34, W4OV 28, W4AAD 32, W4AD 9, W4MU 13, W4AJJ 8, W4AFM 58, W4AAO 26, W4KJ 6, W4AOI 10, W4TM 6.

HUDSON DIVISION

EASTERN NEW YORK — SCM, R. E. Haight, W2LU — Your SCM sends his heartiest wishes for Health, Prosperity and Happiness for the New Year. Following ORS cancelled: W2BIQ, W2BKN and W2AYK. Hats off to W2BZZ, first in this Section to make BPL under new rules. W2CTC moved to new QRA. W2BLU reports W2BAC new ham in Middletown. W2DEL is studying for Commercial Ticket. W2BJA received Certificate of Accuracy of 99.96% in Frequency Test. W2ANV is still pounding out traffic. W2BIA was elected secretary of SARA. W2CQH applied for portable ticket. W2BVR is going to try MOPA. W2CJP was elected Editor of SARA News. W2CL is reappointed O.O. W2UL rebuilt to C.C. W2BER reports many off-frequency stations on 7 mc. W2AVS is getting anxious to try 1750 kc. W2BUN is seeking reliable schedules on 3.5 mc. W2CGO is new president of SARA. W2BJX reports new ham on air, W2DKP. W2CTA made FB QSO with G6RB on 3.5 mc. W2BXP reports power leak breaking up his QSOs. W2ATM reports New Rochelle High School, W2DJS,

will be with us soon. W2OP showed R.I. his shack. W2BDB reports for new club of Kingston Amateur Radio Association. W2CPW, president, W2CDX, W2CZL, W2BNR and W2BDB, secretary. W2ANU also reports new club formed by hams of Oakwood School, Poughkeepsie. W2BSH will be back on air very soon. W2ACB received his Blue Ticket. W2BKM is using crystal. W2BKW was elected treasurer of SARA. W2BWF, new ORS, received Extra 1st Ticket. W2CAZ did same. Let's make 1932 a 100% ORS reporting year.

Traffic: W2BZZ 846, W2LU 206, W2CTC 113, W2BLU 110, W2DEL 96, W2BJA 90, W2BIA 45, W2ANV 40, W2CQH 29, W2BVR 28, W2CJP 28, W2CL 25, W2UL 25, W2BER 22, W2AVS 21, W2BUN 17, W2CGO 11, W2BJX 6, W2CTA 6, W2BXP5, W2ATM 3, W2BDB 2.

NEW YORK CITY AND LONG ISLAND — Acting SCM, W. J. Warringer, W2BPQ — On January first all ORS who had neglected to have their certificates re-indorsed were cancelled; about 15 of them. The following Official Observer appointments have been cancelled for inactivity: W2AFO, W2BIV, W2CYX and W2LR. The Bronx Radio Club is going strong, as is the Manhattan Radio Club. Long Island: W2ADQ, Opr. JE of NURL, leads the pack through a great schedule with Panama. W2AUS is all set for 1750-ke. work. W2AIQ is trying out 56 mc. W2BVB is getting a 50-watt rig going. W2KG received certificate in Frequency Contest. W2BDN is practicing on a bug. W2BDR joined the A.R.R.L. W2AVP-NO keeps W2NO in Brooklyn and W2AVP in Long Beach on the air besides WNYC. W2AGL is battling them out for the Army. W2COI has his secretary, W2BDR, report for him. W2BTE says, "Merry Christmas." W2ANX worked 40 VK's and 15 ZL's in December. W2CHK blanks sent. W2BFG sends in a life history every month. W2BET sends first report. W2RK has new crystal rig. W2AF is using W2AVP-NO special transmitter. W2DIV has a 50 now. W2HE is a commercial op. W2AKL is moving to N. Y. C. W2AST is on 3500-ke. 'phone. W2CEI — same as "AF" above. W2TO and W2CGA are rebuilding. W2WT has a beaut of a crystal job. W2CJA has crystal on 14 mc. W2AEX rebuilds. W2DIT is a new man in Wantagh. John Van Dyke, a pre-war ham, is waiting for a call. Brooklyn: W2BO says traffic picking up. W2DBQ reports W2DT a new man. W2PF's ORS was renewed. W2CCD-APB-KW has gone bugs over 3500 kc. Hi. W2AZV is rebuilding power supply. Says W2BAS might become an ORS. W2BEG is on with flea power. W2LB is on with Naval Reserve. W2BRB is working on radio altimeter in Mich. W2BEV wants to be put on inactive list. Ole 2ADO is back as W2DLK. Bronx: W2BGO has consistent west coast QSOs with 21 watts input. W2FF won a certificate in Frequency Contest. W2CYX is still busy with NRF. W2CBB is now using a WE 75-watter. W2CWP joined job hunting line. W2DJP sends in a report. W2AFT is still working AA schedules. Staten Island: W2WP, the lone representative, is now Staten Island's Route Manager. Manhattan: W2SC reports Opr. Musser "CM" gone on vacation before signing up again. W2BNW finally sends in second report. W2AOY is back. W2AOU reporting for Manhattan Radio Club sends in a total of one message. W2AKM has left N. Y. C. and will be located at the Woods Theatre in Chicago. Chicago hams note: He says your QSL is worth half the price of a ticket. W2BNL has been working on 60 mc. with W2CTF. Jack Paddon, ole 2FU, reports that he is now W2ZZAT and is Ex 1PW. 1HBI, 1BEI, 1ARP, 8ACM, 9ZK, 6AGN, 1TM and 2FU. Whew! W2BDJ is rebuilding into crystal.

Traffic: Long Island — W2ADQ 219, W2AUS 216, W2AIQ 123, W2BVB 82, W2KG 61, W2BDN 54, W2BDR 50, W2AVP-NO 40, W2AGL 25, W2COI 18, W2BTE 18, W2ANX 14, W2CHK 12, W2BET 12, W2BFG 9, Brooklyn — W2BO 103, W2DBQ 85, W2PF 48, W2CCD 21, W2AZV 16, W2LB 15, W2BRB 2, Bronx — W2BGO 63, W2CYX 39, W2CBB 23, W2AFT 12, W2CWP 12, W2DJP 1, Staten Island — W2WP 67, Manhattan — W2SC 46, W2BNW 10, W2AOY 6, W2AOU 1.

NORTHERN NEW JERSEY — SCM, A. G. Wester, Jr., W2WR — W2BPY has been appointed Route Manager and promises plenty of fireworks. W2WR is now in the employ of General Electric Supply Co. in Southern N. J. W2COG

is experimenting with pentodes in receivers. W2CWK reports that the Raritan Valley Radio Club will hold its annual Hamfest, February 8th, at Highland Park Reformed Church. W2AGX is joining the Army Net. W2CJX is still working extreme DX. W2CNL complains about traffic on 7 mc. W2BKE reports after a long silence. W2AUP says the Elizabeth gang have formed a club named the Union County Amateur Radio Association. W2DFM is having good luck with his new MOPA. W2AGO is plenty busy with traffic. W2ALD wants some traffic stations for the U.S.N.R. network. W2CBY wants a schedule on 3.5 mc. for Sunday mornings. W2CAE ks back on air after a long silence. W2BBU makes his own traffic reporting cards. W2DES is stepping out since installing a Zepp.

Traffic: W2COG 6, W2AOS 29, W2CWK 76, W2AGX 6, W2CJX 16, W2CNL 14, W2BPY 46, W2BKE 6, W2AUP 48, W2DFM 9, W2ALD 35, W2CBY 11, W2CAE 1, W2BBU 7, W2AGO 40, W2DES 1.

MIDWEST DIVISION

NEBRASKA — SCM, S. C. Wallace, W9FAM — W9BNT is sure knocking 'em stiff. FB, OM. W9DMY wants to know what's matter; only handled 571 this time. W9DI, the RM, is evidently busy from looks of his total! W9FAM appreciates all the cooperation. W9EWO burned his eyes, but is up and at 'em again. W9FWW is putting Lincoln on the map. W9DGL is stepping right out. W9FUW is doing FB work on both CW and 'phone in A.A.R.S. W9DXU reports. Glad have you with us, OM. W9ETE is pretty busy dispatching. W9EMW is working hard on Army Net. W9BBS is busy breaking on RR. W9EEW doesn't have much to say. W9BHN says too much W.U. W9BQR has an awful time working W9FAM. HI. W9DHC sends in a good report. Thanks to W9HTU for FB report. W9EDI says all set on 3.5 mc. and 1.75 mc. All right, Lincoln, we are looking for you. W9GQU starts off with a bang. W9DHA is keeping Grand Island on the map. W9GAS bursts forth. W9ESY says pretty busy with school. W9HGO is trying to round up the Omaha bunch. W9FXQ-GNZ evidently is a DX bound. HI.

Traffic: W9BNT 1271, W9DMY 571, W9DI 531, W9FAM 437, W9EWO 204, W9FWW 207, W9DGL 139, W9FUW 118, W9DXY 80, W9EYE 70, W9EHV 60, W9BBS 47, W9EEW 10, W9DHC 116, W9HTU 73, W9EDI 47, W9GQU 41, W9DHA 39, W9GAS 33, W9ESY 20, W9HGO 12, W9FXQ-GNZ 2.

IOWA — SCM, Geo. D. Hansen, W9FFD — R. P. Griffith. RM: New ORS, W9BWF; Cancelled ORS, W9FWG; Cancelled OO, W9FZO, Reinstated ORS, W9DNZ; Old man W9EJQ again sets the pace for us, with lots of good schedules. W9BPG is close on the RM's heels. W9ACL noses out W9BJP in a little friendly competition. W9FFD finally accomplished remote control where the OW can watch. HI. W9BJP can give 12-hour service to P. I. and Hawaii. W9EIV reports keeping schedules with everybody. W9DNZ proves that he should be reinstated. W9FYC finished his crystal rig. W9GP reports "busy as a bee." W9DPO is getting lined up in the A.A.R.S. Net. W9DFZ is local net control A.A.R.S. W9IO-YA, reported by W9DBW, handled two transcons on 3.5-mc. 'phone. W9GWT requests foto of "Celia." W9BWF also got in on the transcons. W9AWY is new Iowa member of A.R.R.L. Net for the American Legion. W9EFU is kept plenty busy. W9FLA radios his report. W9CWG reports his Jr. Op. is a howling success. W9DIB reports 7 mc. is still erratic. W9AHX hands his down and with such DX as CM, K6, VK, ZL, PY, TI, and X. W9ANO is working 'phone and CW in the 14-mc. and 1750-kc. bands. W9ECB sends in his first. W9ECB, W9ABE, W9ERY, W9CFB and W9HDF are all new reporters. Welcome, OMs. W9AYC is State Control for A.A.R.S. 'phone stations. W9GDR at KFNH has new crystal job on the air. W9CIJ is on with CC in the 3.5-mc. 'phone band. The message per station average has raised some more. Great! but we can beat that yet fellows! Send in your reports to the SCM. When we say report we don't necessarily mean it should contain a traffic total. We want news. Give it to us.

Traffic: W9EJQ 656, W9BPG 257, W9ACL 177, W9FFD 169, W9BJP 136, W9EIV 124, W9DNZ 123, W9FYC 114.

W9GP 105, W9DPO 93, W9DFZ 90, W9ABE 70, W9IO 55, W9GWT 40, W9BWF 35, W9AWY 34, W9EFU 30, W9HDF 23, W9FLA 21, W9CWG 18, W9DIB 16, W9CFB 14, W9ERY 10, W9AHX 10, W9ECB 8, W9ANO 7, W9AYC 4, W9GDR 4.

KANSAS — SCM, J. H. Amis, W9CET — Thirty-two stations report a total of over 2000. W9BNU leads the gang. RM, W9CFN is a close second. W9FRC has a 'phone rig going. RM, W9FLG is moaning the loss of a rectobulb and filter condenser. W9DVB will take schedules on 7, 3.5 or 1.75 mc. W9NI and W9AWP are having trouble with skip on 3500. W9BBM has made a new TNT rig. W9ESL is building a new receiver. W9EVT has a new National SW3. W9ENU wants to be a regular reporter. W9HL wants a reliable schedule with Denver. W9CET is giving 7000 a fit again. W9PV is working 14,000 'phone. W9ADM has new '52 and rectobulbs. W9EVM is new ham. W9DQJ is on 7000. W9ATR has a new 7-mc. crystal rig. W9GFM has a Type '10 that sounds like a 50-watter. W9CXS is new ham in Emporia. W9DFY has gone commercial. W9FRU has MOPA with '03A in last stage. W9BGL is going crystal control. W9BUY reports a good meeting of the Imperial Radio Club. W9GJU is using an '04A in his 3500 'phone. W9GCL has a new SG receiver. W9BJJ is thinking about changing to push-pull. W9CXW says skip has a bad effect on tempers. W9AFP has moved to St. George. W9DDV is a new ham in Hutchinson. W9EBB is using a '52. W9GKJ is 150 watts crystal. W9BUZ is on 3500 with '01A. W9DEB will be back on the air soon. A new club has been formed at Emporia — The Emporia Radio Transmitting Club. W9PV, president; W9ADM, vice-president; W9ATR, treasurer, and W9DFY, secretary. The K. V. R. C. is holding meetings 2nd and 4th Thursdays, 8:00 p.m., at Topeka Chamber of Commerce. Visitors always welcome. Your SCM wants to hear from every active ham in Kansas on the 15th of each month. With this report we are picking up speed to put Kansas over the top. Let's go!!

Traffic: W9BNU 426, W9CFN 303, W9FRC 198, W9FLG 194, W9DVQ 138, W9NI 104, W9ESL 102, W9EVT 92, W9CUC 86, W9HWW 75, W9CET 59, W9EUN 32, W9HL 32, W9DFY 27, W9DQJ 18, W9GFM 12, W9ADM 6, W9PV 2, W9EVM 2, W9FRU 15, W9BGL 11, W9BBM 53, W9BUY 8, W9GCL 15, W9CXW 10, W9FMX 8, W9GXF 4, W9BSK 2, W9EBB 4, W9AWP 7, W9BJJ 6, W9BUZ 23.

MISSOURI — SCM, L. B. Laizure, W9RR — St. Louis: Several ORS applications have come from St. Louis. The rule on ORS is two months' activity as shown by traffic reported before an appointment can be made. W9BCK and others note. W9DUD is on for traffic. W9DYJ is waiting for license in new address. W9GHH is a new reporter. W9GDU and W9DOE are messing with television. W9BMU says boats tied up for winter so all set for hamming. W9DZN had too much outside QRM. W9FTA still on towboat job. W9DOE reports W9BC now in shape for U.S.N.R. work. W9AMR-HUZ is now on the towboat Minneapolis. St. Joseph: W9BGN boosted his traffic score this month. W9DWF has both CW and 'phone working. State News: W9BJA, our energetic RM and A-A control station, is again on the sick list. A deluge of messages of sympathy reached him via W9FJV. W9ASV is another hospital case for this month. W9BUE also reported down with illness. W9DXD visited the SCM twice during December. W9AWE registers a kick against stations that won't trouble to QRS when asked. W9EVW has been keeping schedules with W9EEW-W9EYE. W9DCD reports radio shop QRM. W9GMI and W9DHX are welcome additions to the reporting ranks. W9BAU sends blanket report for Sedalia: W9BAU blew Type '10. W9BTD, W9CNU, W9HUN and W9GNQ were all home for Christmas. W9EME just got on with 3.5-mc. 'phone. W9FJV reports since he returned to the air a new demand from many hams for his original patented hook-up for low-power, low-price set for hams on the farm with no juice. W9FSU got a sub to QST for Christmas. W9AOG kept daily schedules with W9GCX and W9MC; W9AWC handled traffic until '66 went out; W9FYF QRL radio service job. W9ENF has 4 transmitters for usual bands. W9CLQ and W9GLY are on 56-mc. 'phone. W9EUB is putting in remote control. W9FYM schedules W9AQX and W9AIJ for A-A work. W9EYG-HCP made BPL on

deliveries with 8 schedules going. W9HNM is coming up stronger every month. W9FSL revamped receiver. Marceline hams reported 100% this month. FB. W9CDU is putting in a few licks for traffic-handling. W9GKJ is getting on 3750 kc. for U.S.N.R. skeds. W9CJB says poor luck on 7 mc. at night. W9DHN got transmitter going again during holidays. W9GOM asked for ORS blanks. W9CJR reported by message. W9HWV is a new reporter from Northmoor. W9DIX is with RCA Photophone in NYC. Ex-9EBV is now working wired radio in N. J. Ex-W9DEU got married; exit radio. W9DNO got married, but is still going. W9DHF applied for temporary refrigeration of ORS. W9ALJ is now using 3.5 and 1.75 mc. W9GXT asks about ORS. W9ECE is active in A-A net. W9CRM is trying to get on 7 mc. Kansas City: W9FLQ moved to Pittsburg, Kansas. W9FHV handled still more traffic thanks to schedules. W9FIO handled traffic regularly. W9AKZ is gunning for DX on 14 mc. W9CVT handles traffic whenever possible. W9FLT kept schedule on 3.5-mc. 'phone with W9GFQ. W9BMT QRL grinding crystals. W9BMA says school QRM. W9DPF is building crystal rig. W9FCF combined traffic and DX. W9ELS did a bit of DX. W9EQC reports some good schedules. W9DPJ is on for traffic. W9AQX got two QSLs from NZ reporting 3.5-mc. '10. W9HRX wants ORS. W9HOD replaced '10 with 211E on 7 mc. W9CU is QRT at present. W9NP handled usual wad of U.S.N.R. traffic. W9CFL rebuilt set. New crystals are being ground for NDP-W9NP for 3475-, 4015- and 4265-kc. operation — the latter two for emergency work; these are the frequencies most used by NAA-NPG. W9RR held two U.S.N.R. meetings this month, one in Kansas and one in Nebraska. W9HJH sent in his first traffic report.

Traffic: W9DOE 35, W9BMU 10, W9GHH 1, W9DUD 22, W9BGN 47, W9AWE 7, W9BIU 12, W9EUV 18, W9DCD 7, W9GMI 8, W9DHX 8, W9BAU 4, W9FSU 13, W9FJV 24, W9AOG 11, W9AWC 3, W9ENF 67, W9SEU 2, W9FYM 2, W9EYG 230, W9EJA 452, W9HNM 36, W9FSL 132, W9CDU 9, W9CJB 8, W9DHF 1, W9AIJ 36, W9GXT 8, W9ECE 38, W9HWV 12, W9CJR 10, W9FLQ 1, W9FHV 72, W9FIO 16, W9CVT 11, W9FLT 24, W9BMT 2, W9BMA 6, W9FCF 5, W9ELS 4, W9EQC 50, W9DPJ 20, W9AQX 44, W9HRX 3, W9HOD 8, W9CFL 12, W9BC 6, W9HVJ 12, W9HWE 16, W9PW 27, W9BGW 161, W9GZY 4, W9FBR 11, W9BZY 12, W9DMO 5, W9HUI 6, W9GOM 26, W9DQN 10, W9FPI 52, W9ENU 17, W9BVN 133, W9FNO 38, W9GSV 7, W9CRH 6, W9RR 150, W9ZZ 15, W9PR 5, W9NP 409, W9HJH 8.

NEW ENGLAND DIVISION

VERMONT — SCM, Roy L. Gale, WIBD — WIAAG and WIBHR play checkers by amateur 'phone. WIATF and WIAAX won certificates in frequency measuring contest and join WIBD as Official Observers. WICGV brothers are in N. J. for the winter. WIFN works on 14 mc. WIDAJ says 60 cycles on a 25-cycle transformer makes things all hot! WIBN has a first-class ticket. WICBE is improving his power supply. WIDHX is a new station in Windsor. WIAHN talks of crystal-controlled 'phone. WIAEA is rebuilding. WIAVP sends a handsome card. WICGW has designs on the storage battery in dad's auto. WIBZD has a permanent ticket. WIBNS says firecrackers are FB, while WIBN stoutly maintains that cold water will cool them off. Gosh, now we don't know what to think. WIAD is recruiting a volunteer naval communication reserve unit. WIBAS keeps army schedules. WICGX finds time for a little traffic. WIATU is leaving for his home in Indiana. WIAAK has a 'phone with a '52. WIATZ is on 3.5 mc. with increased power. WIATF has joined a New Brunswick-British Columbia traffic trunk line. WIBD held a long QSO with WIBMS, who was at W4QY. WIBJP is home only for army drills. WICUN operates at WIBJP's shack. WIDBX is regaining his old pioneer enthusiasm. WIAOA reaches out in great style. The SCM wishes to thank all those A.R.R.L. members who have no stations but who reported just the same. Now, gang, aren't you proud of Vermont when it really comes to life?

Traffic: WIATF 155, WIAAX 82, WIBD 68, WIBNS 67, WIAOA 28, WICGX 22, WIBJP 14, WIDBX 11, WIBCK 4, WIBN 3.

MAINE — SCM, John W. Singleton, WICDX — The SCM leads off this month. W1BEU is next. He has been very busy building apparatus for W1DIW, the Naval Reserve Unit station, at Waterville. W1ATO is third in line. W1CPT says he will make the BPL next month. W1BEZ as usual has a nice total, and his signal is one of the very best. W1BOF, RM, District 3, is busy organizing his section of the state. W1CFG has been appointed RM District 4. W1BOZ has been handling some important "sick" messages. W1CRP has a new M.O.P.A. rig. W1AGL sends in his first report. W1BWS is experimenting with new receiver. W1CIP is handling a few now and then. W1APX is changing to push-pull. W1AJC has a schedule with SHVN, a Swedish ship on 7 mc. W1BUO reports via radio. W1AQW is rebuilding again. W1DFQ reports lots of activity in his neck of the woods. W1QH has an inside antenna that works fine. W1BFA is still pushing out a nice signal. W1BWO took part in the Frequency Measuring Contest. The traffic figures this month represent the standing at the end of the first month of the Maine traffic contest. The SCM wishes the gang a very prosperous New Year. Late reports from W1ANH, W1KQ and W1IR just get under the wire.

Traffic: WICDX 328, W1BEU 311, W1CPT 261, W1BEZ 225, W1BOF 220, W1CFG 211, W1BOZ 136, W1CRP 87, W1AGL 60, W1BWS 46, W1CIP 41, W1APX 35, W1AJC 30, W1BUO 25, W1AQW 20, W1DFQ 16, W1VW 28, W1QH 12, W1AXJ 6, W1BWO 6, W1BWP 3, W1BTG 3, W1BWI 1, W1BFA 9, W1ANH 34, W1ATO 278, W1KQ 12, W1IR 41.

EASTERN MASSACHUSETTS — SCM, Joseph A. Mullen, W1ASI — W1ASI is manufacturing new hams at night school. W1ABG reports most ORS as Officially Relaxed Stations. That's bad! W1WU is chasing up new ORS material. Old man W1QC has both guns going and turns in 80 messages after his vacation. W1KH received a certificate of accuracy for the frequency measuring test. W1WV says that the wonderer on 14 mc. is EAK and not WJK. W1AGA is headed for the 1750-kc. band. W1BNJ is installing new crystal. W1LM reports business QRM. W1ACH has a new SW3. W1BMQ has applied for ORS appointment. W1CAW offers frequency reports to anyone asking for them. Our prize traffic man, W1AFP, is writing songs. Hi, W1CHR says his new crystal rig is working out FB. W1CQN is hindered by outside QRM. The bad boy of the Section, W1AAL, has installed a new filter system. W1BGW is playing with audio howlers. W1BFR has just received his new station license. The ORS applicants reporting this month are as follows: W1CAE, W1BSD, W1CFI, W1VS, W1BO and W1AJE. W1AGU is in the hospital with appendicitis. Don't forget to listen to the Official Broadcast Stations for latest A.R.R.L. news. W1BZQ has his transmitter doing police work. W1AKY and W1VA, with 50 and 500 watts respectively, have donated their transmitters to the Quincy police, and the Chief of the Department is singing their praises to the world. The South Shore Amateur Radio Club has cooperated with the Quincy Department and has conducted extensive tests all over the city and adjoining towns compiling valuable information on dead spots and mobile reception of W1AKY. The Department of Commerce has lent the club a willing hand in its activities. FLASH!! W1AJE has new Junior op.

Traffic: W1AFP 107, W1LQ 80, W1ACH 65, W1BGW 61, W1KH 46, W1WV 43, W1ASI 41, W1BSD 32, W1CFI 25, W1LM 17, W1AAL 17, W1CAW 16, W1ABG 15, W1WU 12, W1CHR 12, W1CAE 10, W1AGA 8, W1AJE 5, W1BO 3, W1CQN 3, W1BMQ 7.

WESTERN MASSACHUSETTS — SCM, Leo R. Pelouquin, W1JV — Our drive for additional ORS is beginning to bear fruit. Seven appointments were made this past month: W1OF, W1BXF, W1AZW, W1BVP, W1CCH, W1IAUQ and W1BPN. We need still more ORS. The SCM must insist that present holders of ORS certificates report regularly. Let's all do our bit to put our section on the top. If you are, or know of, a good operator who handles traffic, send in a recommendation for an ORS appointment. Do it now! W1ASY leads in traffic again. W1AIF is back in mid-season form. W1BPN turns in first report as an ORS. W1DR works V08Z on 3.5 mc. W1CCH is back after a period of overhauling. W1BVR is after W1ASY's scalp, and a merry

race for traffic honors is on. W1BNL is having trouble with his new MOPA. W1BXF is trying to start a Radio Club in Franklin County. W1AJD reports skip distance cutting in on his traffic schedules. W1OF is on regularly with a nice crystal note. W1BVX sends in his first traffic report. W1DFV is an old-timer from the 8th District, ex-8-SR. W1BVP is still working on his rectifier. W1AUQ has PDC at last. W1AFI reports for first time. Traffic and U.S.N.R. work keep W1ATK busy. W1APL is using a '52 with 2000 volts on plate. W1NQ will soon be ORS. W1CCS has built a T.N.T. transmitter for traffic work. The gang from the Blackstone Valley report that much action can be expected from W1NS, W1CTF, W1BZJ, W1BFD, W1CHC and W1BYU.

Traffic: W1ASY 131, W1AIF 84, W1BPN 59, W1DR 58, W1CCH 43, W1BVR 40, W1BNL 32, W1BXF 30, W1AJD 24, W1OF 24, W1BVX 20, W1DFV 18, W1BVP 15, W1AUQ 14, W1AFI 7, W1ATK 6, W1APL 6, W1NQ 6, W1CCS 4.

NEW HAMPSHIRE — SCM, V. W. Hodge, W1ATJ — W1IP is enjoying himself again, with lots of traffic and six daily schedules. W1AUQ reports working G2AY on 1750-ke. 'phone. A new ham in Concord is W1CUW and W1CVK is same in Durham. W1AVG is on with crystal rig. W1BFT reports some fine DX. W1CJO is rebuilding. W1AXL is trying 14 mc. W1CEA is using a push-pull rig. W1AEF is re-wiring his MOPA. W1APK has made a lot of changes. W1BVJ is keeping three schedules daily. W1CGH is getting out fine. W1BCP is rigging up for 'phone. W1BGL is again rebuilding receiver. W1CLT has been working fine DX. W1HHG in Gorham is new ORS.

Traffic: W1IP 384, W1BVJ 88, W1BFT 50, W1AEF 20, W1AXL 18, W1APK 7, W1CLT 9, W1BAC 2.

CONNECTICUT — SCM, Fred A. Ellis, Jr., W1CTI — I wish to thank all the gang that helped recruit me, and hope I can continue to deserve their fine support. On December 13th a "convention" was held at the Hotel Bond in Hartford with a large attendance despite the wet weather. In the afternoon speakers were L. W. Hatry of Hatry and Young, Mr. L. E. Barton, an RCA-Victor Engineer, Jim Lamb of Headquarters, Mr. R. S. Kruse, and George Grammer. A visit to A.R.R.L. Headquarters was next in order. The banquet was scheduled for 6:45 with Messrs. Maxim, Warner, Ward and Hebert as speakers. It was a fine get-together and credit goes to W1AVK and W1AOX for organizing it. R.P. spends his spare time walking the fence at the air field. W1AFB seems to be altogether too chummy with RP lately. W1CJD has a new transmitter every day. W1BEO pinch hits for W1CJD when "Gil" can't make a schedule. W1HD blew his power supply. W1BHQ says the Hartford gang will play checkers via radio with anyone interested. W1CTI attended the afternoon session of the "convention" with W1BHM, W1ARB and W1HD. W1BVW has inaugurated a schedule between Yale and U. of Pa. W1BHM says too much QRM on 3595 kc. W1ES is on the air daily at 7:25 a.m. Give "A. H." a call when you have Hdq. traffic. W1AMG has opened up with a bang in Stamford. W1BNB has been giving 7 mc. a try. W1AVB is getting a new receiver. W1AOK CQs west and gives a 9 in Chicago a message for West Hartford. Hi! W1TD is perking out better. W1ASP won a mike at the "convention." W1BAX reports. W1AZT sends in his first report. W1NN is QRL at W1CC. W1BBJ was reported heard in Russia. W1AQF says W5RB is a YL. W1CNU is laid up with a bad cold. W1BFS has three transmitters. W1AMQ is rebuilding to crystal. W1AZG is rebuilding. W1BEI is pounding out FB. W1CTC says 1750 kc. is the berries. W1QY has a new push-pull '52. W1CTO is using remote control. W1CDI reaches out FB. W1DCM has a new MOPA. W1CEK has been appointed OBS. Mr. R. W. Woodward, a pre-war ham, of West Hartford has been appointed O.O. A parson recently gave Roddy, W1SZ, a life sentence. Congrats. "Rod." W1BDI and W1UE are located at the same QRA. W1APZ has been busy rebuilding the transmitter at W1CBA. The C.B.A. meets every Thursday evening at their club rooms in Noroton Heights. Visitors welcome.

Traffic: W1MK 405, W1AFB 231, W1CJD 201, W1BEO 131, W1HD 124, W1BHQ 115, W1CTI 66, W1BVW 60, W1BHM 58, W1ES 33, W1AMG 26, W1BNB 22, W1AVB 22, W1AOK 18, W1TD 17, W1ASP 11, W1BAX 8, W1FL 7,

W1AZT 6, W1NN 5, W1BBJ 4, W1AQF 3, W1CNU 3, W1BFS 2, W1CTC 12, W1QY 9, W1CTO 10, W1CDI 6, W1DCM 2.

RHODE ISLAND — SCM, N. H. Miller, W1AWE — W1CPH is building a 100-watt 28-mc. outfit. W1DBA, W1DAH, W1EX, W1GV, W1BLJ and W1FU are on with the U.S.N.R. W1BUX is putting in a new filter. W1MO says DX wasn't so good. W1AWE is waiting for January 18th, when he will be a married man. W1CAB is still going strong. W1ATM reports a new ham in Pawtucket, W1DCH. W1TQ, W1BES, W1AFO, W1CMG, and W1ID keep the air filled with 'phone on 3500 kc. W1BDQ is busy. W1AQ is looking forward to the A.R.R.L. Convention in Providence this spring. W1ARK, a newly married ham, is back on the air with an MOPA. W1BGM has a low-power outfit on 14 mc. W1BLV holds down the reputation of Woonsocket. W1TZ is perking out OK with a crystal on 3500 kc. W1BDZ handles a few now and then. W1CGO is looking for schedules. W1ASZ finished his AC receiver. W1BTP has some new '66s. W1BOY reports a new ham in Pawtucket, W1BRU. W1CPV is now a member of the Army Amateur net. W1BQD is busy with BCL work. W1MG is on once in a while.

Traffic: W1CAB 56, W1AWE 27, W1BTP 20, W1BDZ 11, W1CPV 11, W1ASZ 8, W1MO 6, W1ATM 6, W1BUX 6, W1CGO 6, W1BOY 4.

NORTHWESTERN DIVISION

MONTANA — SCM, O. W. Viers, W7AAT — W7ASQ is the proud father of a 7-pound baby girl. Congratulations, OM. Where're the cigars?? W7BBS and W7ASB are new ORS. W7AWM is awaiting a crystal and pair of '66s. W7CU says the Missoula Radio Club will soon be on. W7AHF has been experimenting with a 3500-ke. MOPA. W7HP had a vacation of three weeks in the hospital. W7AYG hooked W9HAY of the 9th District Barnyard Club. W7AIR is putting in a new push-pull MOPA. W7AAT received a "heard" report from Moscow, Russia, on 7 mc. with the new crystal job. W7BIZ will soon be on with high power. W7BFA is busy with YLs.

Traffic: W7AAT 103, W7ASQ 14, W7BBS 6, W7CU 5, W7AHF 5.

OREGON — SCM, Dr. Dolph L. Craig, W7ALO — W7AWH leads in traffic with 140. He handles the A.A.R.S. work. W7ACH has his schedules perking now. W7QY reports a new ham, W7BNG. W7AJW has a new 100-watt crystal job. W7AMF keeps 4 schedules, one a KA. W7APE has been appointed OBS for the Coos Bay Section. W7PE turns in his best report so far. W7MQ likes 14 mc. W7SJ has been granted ORS and is new Oregon member of A.R.R.L. net for the American Legion. W7AME has moved to Portland. W7ZD blew a type '10. Hi. W7AYN reports. W7AYV sends in his first report. W7ED reports a FB club with 21 members in Astoria. W7WR has a dandy bunch of daily schedules. W7AEM wants to be an ORS. W7AJN says the depression gives him lots of time to operate. Hi. W7ALM misses the kick of his old '04A. W7IF is experimenting with AC receivers. W7BLJ is getting lots of DX. W7AHJ reports 3500-ke. FB for daylight work. W7BLN is getting out FB. W7AVT is putting in crystal. W7AWO has been appointed SC for Navy Net. W7AJX has a new 3500-ke. zepp. W7BKG has a new crystal rig. W7BLF is QRL school work. W7BNE has been off the air with an infected hand. W7AEJ is building new C.C. transmitter. W7AZJ has a new bank of electrolytic condensers. W7BCZ changed transmitter circuit. W7OB is revamping receiver. W7LP reports working the first YL in Hawaii, K6OW. W7ALO is trying to line up some advertising so he can put out a monthly bulletin. Lots of reports this month. Keep 'em coming gang.

Traffic: W7AWH 140, W7QY 94, W7ACH 84, W7WR 65, W7PE 62, W7ED 52, W7AEM 38, W7SY 31, W7AMF 22, W7APE 19, W7AXO 15, W7AYN 15, W7AME 14, W7ALM 14, W7AJN 7, W7AYV 7, W7ZD 3, W7EN 4, W7ALO 4.

ALASKA — SCM, W. B. Wilson, W7WDN — The winter months are with us here in the north, with consequent delay in mail schedules. More active stations this winter than for the past four years. K7ANQ is back on the air from her vacation and ready for plenty of traffic. The second op

at K7ANQ is also a YL. K7BLI, the new ORS at Kennebec, turned in a fine total, and says he thinks Alaska will be able to show something to talk about soon. K7BDE sends us a lot of news on Alaskan stations via W7TX. K7BOE did good work obtaining doctor and medical supplies for native school at Ugashik during scarlet fever epidemic. K7BDE has a YL in training as second operator. K7ASM and K7VOE have fine 3.5-mc. 'phones. K7FF puts a husky signal into the states. K7ATD is mourning the loss of a pair of '10s and his tom cat. Active stations are K7ALN, K7BLR, K7ATF, K7ACD, K7BKN, K7PQ and K7AUM. If every active Alaskan amateur will report to the SCM each month, we'll soon have one of the most active sections in the Northwestern Division. What say, fellows, will you cooperate?

Traffic: K7ANQ 24, K7BLI 151, K7BDE 137.

WASHINGTON — SCM, Eugene A. Piety, W7ACS — This being my last report, I shall first say that I have enjoyed working with you fellows. I appreciate the cooperation that you have shown me and I hope that you will all get behind the new SCM and put the Section over with a bang! With a bunch of good schedules W7BB runs up a total of 1099 and leads the Section. FB. W7AG-SL took part in the transcons. W7AHO reports for the Spokane Radio Operators Club gang. W7HS is handling lots of traffic. W7QE is the latest Spokane station to go crystal control. W7AGK, W7AKL and W7BGN are new stations in Spokane. W7VL was reelected president of the S.R.O.C. W7TX continues his FB Alaskan schedules. W7ANP is the new Supervisor of NDQ. W7AAE is on 3.5 mc. with 'phone. W7RT is the new SCM. W7AVM got a lot of traffic through newspaper publicity. W7QI has a new crystal-controlled job. A lot of W7TK's operation was on Army Net. W7BLS, W7BLX, W7BMU, and W7BGJ are new hams in Everett. Clarkston is active with W7BDO on 7 mc.; W7ALZ on 3.5-mc. 'phone; and W7BBG on 3.5 mc. W7AIT kept a schedule with W7ABN. The Rho Epsilon Fraternity of Pullman, W7YH, does a little work on the air now and then. W7BHH is another Navy Net man. The Moran School Station, W7AIE, burned down recently. W7TZ is on in Hoquiam. In Yakima, Clayton is busy installing a new transmitter at KIT. W7BCS, W7AYO, W7AQ, W7ADS and W7ANF all report. W7BGE is home from the Navy. The Yakima report is sent in by Miss Mowery. W7BHW and W7AGE report for the second time. W7BID heard Japan on short-wave broadcasting. The Everett High Radio Club is on with W7RK. The Seattle Ham Club is sponsoring a local traffic contest. Five Seattle High Schools are on with stations now. They are: Franklin, W7BFZ, Roosevelt, W7GN; Broadway, W7AOK; Ballard, W7EA, Garfield, W7AUC. W7BCB is a new YL in Seattle. W7BAC worked CM8YB and a ZL with one '10. W7VN worked ZL on 7 mc. W7AB is on with a crystal rig. W7VG is experimenting on 14 and 28 mc. W7HE just returned from Alaska. W7WG is trying out a push-pull rig. W7AAO, W7TP and W7DF are busy working. W7SL-AG still pounds out with his 'phone. W7IA is also on 'phone. W7OV is keeping a trick at KPE. W7JT is trying out the 1750-ke. band. W7AWA just got on with high power. W7AZM is the communication manager for the Seattle High School League. W7AXT is on with 50 watts in Bremerton. W7FK and W7APO help to keep Seattle going. W7AJI keeps Spokane active. W7NQ has a copper-shielded room. W7DN owns a cafeteria in Seattle. W7AQM is attending the U. of W. W7AF at Decatur Island has new lighting system which puts him at a disadvantage. W7MB gave a speech before the Seattle Club. W7ASL runs a radio supply store. W7AX is now located at Rainier Valley. K7ARL is visiting in Seattle. W7APT kicks because 3500-ke. antennas are too long. W7AQB of Aberdeen is using B Batteries. W7AZA also is in Aberdeen. W7YC is very active. W7BB has several operators now. K7HL is doing research work in Seattle. W7FP keeps Renton alive. W7ATA is on with a queer note. W7ART is on 3500-ke. 'phone. W7VF has an excellent 'phone rig. W7AVN is busy with Navy Net work. W7AAX contacts as much DX as ever. W7BG is on occasionally. W7AZY is on quite a bit of the time. W7BMI is attending the College of Puget Sound. W7KQ is busy grinding crystals. W7ACS has his new transmitter all done.

Traffic: W7AAE 66, W7TX 103, W7ANP 66, W7RT 64, W7AGE 50, W7TK 33, W7QI 31, W7AVM 31, W7AIT

18, W7BCS 18, W7TZ 16, W7ADS 15, W7BHH 14, W7AYO 12, W7BHW 9, W7BID 8, W7BZ 6, W7AVN 4, W7AQ 4, W7BDO 4, W7YH 2, W7AIE 2, W7BCB 2, W7ANF 1, W7AG-SL 29, W7BB 1099, W7HS 266, W7APR 31, W7ABX 18, W7AJI 7, W7QE 54, W7AHO 52.

PACIFIC DIVISION

SAN DIEGO — SCM, H. A. Ambler, W6EOP — W6BKK leads the section. This is his last report for some time as he is leaving San Diego. W6QA is the new RM for Imperial Valley. Get in touch with him for schedules. W6BGL has rebuilt his 'phone. W6EPW is now an ORS. W6CTP says east coast stations coming in fine. W6AXN put up a new 60 ft. mast. W6BAM worked Chile. W6BCF is trying for ORS. W6EOH is building a new receiver. W6AYQ is QRL college. W6EFD is a hot 'phone man. W6KD donated his complete station to the radio club. W6DAZ is busy trying to learn all about airplanes. W6CXN says ham radio is FB. W6DDJ is busy "Saying it with flowers." W6BEY says jobs are scarce. W6CQW has his hands full with army drills and trucking. W6EAB will be on as soon as he finishes grinding his crystal. W6FEX is in the Imperial Valley for a short time. W6AMO is back on 'phone. W6AKY is trying for DX. W6QY went to Los Angeles. W6LD blew up his power transformer. W6DNW is QRL making candy. W6DNL is out on a five months' cruise. W6VQ is trying for ORS. W6EOP built a low power 'phone. W6EOL is back on the air with a type '10. W6DNS has a new crystal. W6AJM is back on the 7-mc. band. W6DAI is building a new C. C. transmitter. W6BFB can sling a wicked milk bottle.

Traffic: W6BKK 120, W6QA 28, W6BGL 26, W6EPW 13, W6EOP 8, W6CTP 5, W6AXN 4, W6BAM 1, W6BCF 1.

SACRAMENTO VALLEY — SCM, Paul S. Farrelle, W6AXM — W6AIM is still high traffic man, with W6AK a close second. W6CMA fell down this month. W6ELC, W6ADS and ExOMITB took commercial exams. W6DGQ took amateur extra first. W6EJC, W6EOC, W6AID and W6AXM took broadcast operator exams. W6CAW will be an OO in the new OO system in this section. W6EOU has a FB 50-watt MOPA. W6QT is going again with FB crystal. W6BYB almost made the Silent Keys column. W6DVE was heard handling traffic as was W6EFM. HOW ABOUT REPORTING? Ex-KA1DJ is pushing the key at WZAG at Mather Field. W6BSN says he handles 4000 words of traffic a day — at KRJ. Hi. W6CFP flunked commercial and amateur exams. Hi. W6DKW says there isn't any DX to work now. W6FW and W6NT are heard occasionally. W6AAC and W6AFU: Please send in Form No. 1 on the 16th of the month. W6AK is new ORS. OO W6EJC says if you are off wave, you may expect a card. W6AXM has been building crystal rig. W6APJ and W6CNM from Lodi, paid the SCM a visit.

Traffic: W6AIM 12, W6AK 10.

SAN FRANCISCO — SCM, C. Bane, W6WB — W6DFR leads all comers. W6NK is a new ORS. W6MV has returned with new transmitter. W6CAL has been occupied with school work. W6ZS has moved to Marin County. W6DZZ is too busy with school to think of radio. W6AVO reports for first time in months. W6ADK installed a '52. 14 mc. isn't treating W6IU very kindly. W6DWJ is about ready to come on with new transmitter. The new officers of the A.R.A. of S.F. are W6AKU, president; W6WB, vice-president; W6CIS, secretary, and W6ETH, treasurer. W6DHE reports that the old fifty went west so no traffic this time.

Traffic: W6DFR 160, W6MV 97, W6NK 78, W6CAL 10, W6DZZ 4, W6AVO 14, W6ADK 7, W6IU 11.

EAST BAY — SCM, J. Walter Frates, W6CZR — W6ATJ tops the section again this month with one of his largest traffic totals. Splendid work, OM. W6CTX is rattling off the traffic in great shape and is second high. W6BPC is pounding away with Army Net work and keeping schedules with Hawaiian amateurs. W6IRJ reports that the ancient power line-breaker switch in his neighborhood has been finally removed and there is no longer a power leak at his place. He says: "Praise God from whom all blessings flow." W6EDO reported again this month after a long silence and has a nifty crystal outfit. W6AF reports DX to

the west has been poor and that he has confined his schedules with W7 stations for traffic purposes only. W6ZM has been hammering away with his new transmitter and doing some construction work on the side. W6BMS is overjoyed because he handled some traffic again this month after a long period of traffic inactivity. W6CDA took a message from TI2FG and got an answer back to him from San Francisco in seven minutes. FB. W6EDR has just gotten on the air with two '45s in push-pull TNT. W6BYS hasn't received his station license yet, but he has a 1 KW bottle now so when he does get it watch out! W6CZN is busy building a bridge, and hasn't much time for operating. Jerome Abernathy has received his operator's license, but is still waiting for his station license. W6AUT has also been too busy to do any operating. W6AOH has just finished putting in a '52 in place of his old 50 watter. W6EGM has been awaiting the arrival of his ticket for his new QRA. W6CDP has a new AC receiver using a pentode tube in the second audio stage. W6BKM is building both transmitter and receiver. W6FBH has moved back to Santa Rosa from Oakland.

Traffic: W6ATJ 422, W6CTX 183, W6BPC 115, W6RJ 92, W6EDO 64, W6AF 53, W6ZM 24, W6FBH 8, W6AOH 5, W6BMS 4, W6CDA 2.

SAN JOAQUIN VALLEY — SCM, E. J. Beall, W6BVY — Sorry, gang, there was no report last month. There were plenty active last month but they just overlooked reporting. W6FFU, W6BUZ and W6BVY maintain twice a week schedule on 1750 kc. W6CLP has two transmitters. W6BUZ, W6BVY, W6FFU and W6KU had starters for the transcons but not much luck on 1750 kc. W6DQV is rebuilding for crystal. W6EUJ operates W6DFJ until he gets results of his exam from the R. I. W6AME has a nifty MOPA job. W6ZZD is in Medford, Ore. W6CYV on 3.5 mc. uses TNT '10 with 550 volts. W6EOM is new ham. W6EJE has new crystal rig. W6YE's 3.5 mc. 'phone is FB. W6BWK is laid up after auto accident. W6EFV is announcer at Fresno Bee KMJ and is about to jump off into space with W6BWK's niece. (FB, OM. Lots of luck — SCM.) W6SF in Stockton is ONE ham that did not fail us last month. W6BBC has weekly schedule with K6BOE. W6BXB, W6BEW, W6EZT, W6EZN and W6BRJ are new hams in Stockton. W6DZN is trying 14 mc. W6BBC also has low power transmitter on 14 mc. W6EXH, W6BFH and W6BNX are active. Stockton C. of C. supplied QSL cards to the Stockton hams. W6ETN is rebuilding his receiver to AC. W6AOA reported for the Bakersfield gang. W6WA is waiting to hear what the Madrid Conference says about hams before he comes back on. W6AOA keeps four schedules: W5VQ, W6ETJ, W6YG and W6BVE. W6ENQ is working in Fresno and has his portable, W6BEO, with him. W6AOB is working in Hollywood. W6DOO is new man. All ORS who have not had their certificates endorsed had better send them in. This also applies to the OOs. At this writing Fresno is planning a joint U.S.N.R.-A.R.R.L. meeting January 9th-10th. W6BVY has crystal on 3873 kes. when not on 3895 for U.S.N.R. schedules. Best wishes for the New Year, fellows.

Traffic: W6DQV 18, W6BUZ 13, W6KU 7, W6FFU 76, W6CLP 13, W6ZZD 11, W6EUJ 61, W6DFJ 52, W6AOA 694, W6CNF 129, W6DZN 96, W6BBC 60, W6SF 54, W6DXL 2, W6BVY 137.

SANTA CLARA VALLEY — SCM, F. J. Quement, W6NX — At this time I wish all the members of my section a most Happy New Year. It is with pride that I review the accomplishments of the past year and the harmonious co-operative spirit which prompted them. The wonderful support given by this section to our own candidate, W6HM, in his race for directorship is something that cannot be expressed with words. His victory places this section in a position to assume leadership in the Pacific Division. For the second time a director has been chosen from this section! A well-attended hamfest was staged by the SCCARA during the month and the famous SCCARA Italian feed went over big! Intense amateur activity in any particular locality can usually be traced to the untiring efforts of one man and the Santa Cruz amateurs owe a debt of gratitude to W6EMZ, Frank Kazmarek. W6YG is in operation daily, and as Ensign in USNR he commands Unit 2 (W6NJ).

W6YG nosed out Bruce Stone W6AMM in this month's traffic race. W6AMM with daily schedules with PI can handle more traffic — let's load him up! Colonel Clair Foster, W6HM and Director of the Pacific Division, is back again with his transpacific schedules. W6FEY, his neighbor, is getting ready for a busy season and has high hopes of putting 500 messages across the pond each month. W6FBW just missed making the BPL. W6NJ is control station for the USNR Section at Santa Cruz. W6YL was completely remodeled. W6BMW complains of heavy QRM on 7 mc. W6FBU is working on W6YX — nearing completion. W6DCP is making Blocks to order — they are FB. W6BAX is now on air with one KW, making same the highest powered in the section. W6DBQ was the only Watsonville station to report this month??? W6CEO just put a '52 in c.e. on the air. A tri-section meeting was held in San Jose on January 9th. It was a big success and the gang were introduced to Colonel Clair Foster, the new Director. A few ORS have not as yet returned their certificates for endorsement. Unless they are sent in soon they will be cancelled.

Traffic: W6YG 328, W6AMM 305, W6HM 204, W6FBW 180, W6FEY 160, W6NJ 99, W6YL 69, W6BMW 53, W6FBU 37, W6DCP 26, W6BAX 21, W6DBQ 1, W6CEO 3, W6BHY 19.

LOS ANGELES — SCM, H. E. Nahmens, W6HT — The entire section is beginning to hum with action. Three men make the BPL. W6SN, W6CVZ, and W6YAU. W6SN stands far out in front with a real total. Since his appointment as ORS, W6CVZ has leaped to the top as a traffic man. W6YAU now has 64 schedules per week! Chief RM W6ETJ, handled a 350-word message to President Hoover. W6BP is shoving 3630-ke. signals into South Africa. W6BYF has a good total. W6ACL received 99.95% on his frequency test certificate. W6GM is another man who made the grade. W6AKW says being snowbound caused late report. Hi! W6AM claims three countries answered one 7 mc. CQ and were worked at same time. W6BLS deserves to be an ORS. A push-pull '10 job for 3990 kc. Navy Net work is under construction at W6EQW. W6CXW can't find enough traffic to satisfy his schedules. A lot of new hams are sprouting in Baldwin Park according to W6EBK. W6AWY is active in both the USNR and AA nets. The 70 foot stick at W6RZ got the neighbors up in arms. And then W6TE has the nerve to hang his 80 meter herts on a BCL's pole. Hi! Portable W6ZZA was QSO five countries during three-day stay at 'Frisco hotel. W6UJ is still too busy to get on air much. Good schedules brought up the total at W6DWW. W6BIK took message for March Field from K6FCX and sent answer back in seven minutes. FB. RM W6ALQ is putting in higher power. San Luis Obispo fans received dope direct on recent championship game with Covina from portable W6EAT and W6ALQ tie-up. W6ADJ conducts code practice bench free of charge to beginners. Traffic has taken a rise at W6DNA since he joined the AARS. W6EGJ, W6DJS, W6DYQ, W6DBJ and W6FFC report for the first time. W6EEA and W6DJS are looking forward to being ORS. W6BGF finally got the sticks up at his new QRA. W6BVC is building a 14- and 3.5-mc. crystal controlled 'phone job. W6CVV can work all the eastern stuff he can hear but nd west. W6HT can operate in comfort with new remote control system. W6EVE was on pins and needles all month — waiting for Santa Claus. W6MA was QSO her OM, W6ZZA, in four states during past month. W6DZI got a crystal for Christmas. W6BVZ is on 1.7 mc. 'phone working duplex with the fellows on 3.5 mc. W6DNF and W6FT both have new radio shacks. W6DSP is building a 3.5-mc. crystal 'phone job. W6AIX is busy at J.C. W6BME says either the QRM is too much competition for his '10 or he needs a new receiver. W6AEO has switched to single wire fed antenna. W6EUV is attending U. S. C. law school. W6TN was busy all month changing QRA. W6BPU is rebuilding to crystal control, CW and 'phone. W6FFC is President of the Santa Barbara Radio Club. W6BJC has a new call, W6VB, and a commercial ticket. W6EGH is off the air due to blown mercury arc. W6WO and W6EGW both have new QRAs. W6EGC returns to the air for first time since 1928. Depression is holding up production at both W6BUX and W6DLI. The following men report: W6DZF, W6CZT, W6DEP, W6ERL, W6ON, W6FAV, W6EZK,

and W6AKD. The new officers of the Amateur Radio Club of San Bernardino are: W6GM, president; W6AMF, vice-president, and W6DGH, secretary. Members of the Santa Barbara Radio Club are gradually getting their stations in shape to handle regular traffic schedules. PLEASE NOTE: Reports must be mailed on the 16th to reach me in time for monthly report to HQ. Thanks.

Traffic: W6SN 646, W6CVZ 324, W6YAU 206, W6ETJ 156, W6BP 107, W6ACL 103, W6AKW 91, W6AM 87, W6BLS 77, W6EQW 76, W6BVD 71, W6DWW 66, W6CXW 56, W6EBK 52, W6UJ 49, W6DEP 32, W6AWY 23, W6RZ 21, W6TE 21, W6ZZA 20, W6BIK 19, W6AVJ 18, W6ALQ 18, W6FEW 17, W6DZF 17, W6CZT 16, W6DNA 16, W6EGJ 16, W6DLI 16, W6EEA 15, W6BYF 102, W6DJS 13, W6EVE 12, W6BGF 12, W6BVC 12, W6CVV 11, W6HT 11, W6ERL 8, W6ON 8, W6MA 8, W6DZI 7, W6BVZ 6, W6DSP 6, W6ALX 5, W6BME 4, W6AEO 4, W6EUV 4, W6FAV 4, W6TN 3, W6BPU 3, W6FFC 3, W6EZK 2, W6AKD 1, W6DYQ 1, W6DBJ 1.

NEVADA — SCM, Keston L. Ramsey, W6EAD — W6CRF built August QST 56-mc. receiver. W6BYR has a new crystal oscillator. W6EAD is using a two KW transformer. W6DST is building a new receiver. W6AJP has a new crystal job working fine on 3.5-mc. band.

Traffic: W6AJP 38, W6UO 7, W6CRF 10, W6BYR 5.

HAWAII — SCM, L. A. Walworth, K6CIB — The Annual Hawaiian Section Convention is past history now. It was a great success. Hon. Raymond C. Brown was chief speaker and told of his brass pounding days before he was acting Governor of Hawaii. K6AIU is president of the new radio club, one result of the convention. K6AJA has started a petition to nominate K6COG for the SCM race. O4AU, S. L. Seaton, writes that he desires to work K6 stations as relay points for VK6MO, the Australian Carnegie Observatory. Don't disappoint him, gang. We all know him from his experience on the ill-fated *Carnegie* at Samoa. K6OW, wife of K6AJA, is the first lady in Hawaii to get a station license. K6DV and K6AVL ops went to Hilo after the convention. K6CRW and K6DYC of Maui have invited the Hawaiian amateurs to accept their famed hospitality for the convention next year. K6FCX reports heavy QRM disturbs his midnight slumbers since a 7-pound girl arrived in his home. K6ERH has become W9EKV since he arrived in Chicago. K6AUQ of Fort Kamehameha makes BPL with 521.

Traffic: K6AUQ 521, K6BOE 240, K6AJA 119, K6DVZ 137, K6FCX 169, K6IR 61, K6COG 22, K6AYD 20, K6DYC 17, K6ANA 12, K6CIB 7, K6ERO 1, K6EDH 1.

PHILIPPINES — Acting SCM, I. S. Liner, KA1SL — This report received via radio by W6ALU and mailed to HQS. KA1HR leads, with KA1CM, KA1JR, KA1SP and KA1SL next. Congratulations to our new ORS, KA1SP, on the recent appearance of a Junior operator.

Traffic: KA1HR 1028, KA1CM 129, KA1JR 81, KA1SL 56, KA1SP 37.

ARIZONA — SCM, Ernest Mendoza, W6BJF — The Arizona Section last month came up from fifth to fourth place in the traffic totals amongst the eleven Pacific Division Sections. Don't forget to send in your traffic totals each month, even if they are small. A statewide American Legion net composed of 3500-ke. 'phone stations W6CKW, W6FAI, W6EUT, W6CEC, W6AEK, W6DKF and W6EJN functioned perfectly on its inauguration. The department adjutant and post commanders of several cities had the opportunity to speak directly to one another. Good work, fellows. W6CVV and W6EFC are now owners of extra first grade amateur tickets. W6ALU makes the BPL every month by schedules with KA1HR and WLM. W6CPF may have to go back to Scotland. W6EUT's '10 crystal on 7215 worked OK the first night. W6CVV will be the new OBS in Tucson, replacing W6CPF. W6CKW has donated his station for the use of his local American Legion post. W6BVN is still editing her clubs' "Short Wave News." W6CEC is experimenting with converters. W6EFN's new crystal works but he is QRL work. W6BLP is getting tired of MOPA. W6BJF built an all electric AC-band spread frequency meter. W6FBN is on CW in Williams. W6DKF is an assayer at Hayden on 3.5-mc. 'phone. W6DSQ is on 'phone consistently. W6BRI is heard occasionally. W6HS, RM, is

now traveling with a complete AC portable transmitter and receiver. He says 4LH is coming on with 'phone in Nogales. W6BYD, W6AEK, and W6CEC have put in an order apiece for two-button "mikes" made by W6CKW. W6EEJ is using two '45s in p.p. W6EBP is accumulating parts for his first "ham" transmitter. W6AWG has returned to Los Angeles. W6ASA, an old timer from the old spark days, is building a receiver. Ex-6DWP has finally received his green ticket. W6DRX has a TPTG '10 rig coming up. W6AMV is QRL work. W6AND has a nice new replacement on his defective '03A. W6DOW is using a pp TNT '10 transmitter. W6EKP is going to add MOPA to his PP TNT.

Traffic: W6ALU 599, W6CPF 141, W6EFC 106, W6EUT 51, W6CVV 36, W6CKW 28, W6BVN 23, W6CEC 16, W6EFN 16, W6BLP 14, W6BFJ 8, W6FBN 8, W6DKF 6, W6DSQ 4, W6BRI 2, W6HS 2, W6BYD 2.

ROANOKE DIVISION

WEST VIRGINIA — SCM, C. S. Hoffman, Jr., W8HD — W8DPO has been doing some good Official Observer work. W8OK leads in traffic. W8TI says he can light more electric lights with his RF than any other ham on 3.5 mc! W8MN and W8BDD are having key click trouble. W8CJM is on with a '52. Wheeling seems to be the most active center this month, with W8ADI, W8BWK, W8BJB, W8BOW, W8CSF, W8AZD, W8CDV, W8EUL and W8FAA turning in traffic reports. W8ADI has schedules with W8CAY and W8ANS. W8CSF was assigned W8CRC for portable call. W8DDP changed to W8FQA. W8DJD is new station in Wheeling. W8HD was assigned call WLH3 for A.A.R.S. on 6990 kc. ORS Certificates renewed for another year: W8BWK and W8DPO; W8JM cancelled.

Traffic: W8OK 81, W8HD 21, W8CDV 12, W8ADI 11, W8BOW 10, W8CJM 7, W8AZD 7, W8BDD 4, W8ELO 3, W8CSF 2, W8BWK 2, W8TI 1, W8FAA 6, W8BJB 7, W8DPO 13.

NORTH CAROLINA — SCM, H. L. Caveness, W4DW — It is very gratifying to see the traffic total for the Old North State gradually climbing, and the SCM takes great pride in sending in this month probably the best report in the history of A.R.R.L. activities in this State. W4AOE on 7126 kc. is at present the leading traffic handling station of the State. One of his relayed messages this month was to the President of the United States. W4ATC, the club station of State College, has done good work with traffic this month. W4TR is working 'phone in the 3500-ke. band. W4BX says weather conditions there have been adverse. W4DQ spends his time rag chewing. W4IF on 7038 kc. would appreciate hearing from stations who copy his OB regularly. W4ABW is training two or three future hams. W4MR was on 14 mc. for a few days and worked some DX. W4RE reports a new ham, W4ALM. W4AAE got commercial ticket; portable call, W4PCR; a bug; an ORS appointment; and remote control in the house for cold weather. W4AZP, Monroe, Route 6, a new ham, sends us his report card. W4VB favors us with his first report. W4AVT has been appointed ORS. W4VI says a new baby boy causes him so much QRM that it is impossible to do much work. A local bank failure has temporarily separated W4ANU from the idea of crystal control. W4EG has enlarged his shack. W4RV is now operating his crystal outfit with remote control. The SCM is on 3865 kc. with 75-watt crystal rig nearly every night, and on about 7120 kc. with another 75-watt crystal outfit usually between noon and 2:00 p.m. every day. Give him a call.

Traffic: W4AOE 700, W4ATC 258, W4DW 110, W4AAE 34, W4MR 28, W4VB 22, W4RE 13, W4IF 12, W4BX 11, W4ABW 9, W4TR 4.

VIRGINIA — SCM, R. N. Eubank, W3AAJ — Thanks all for splendid help in all ways. Happy New Year. All reports are welcomed. W3AAJ is 3690-ke. crystal. W3WO has fine total. Schedules do it. W3YD loses Greenbaum. W3BAG is new station in Ashland. W3AGH is after all traffic. W3FJ has crystal now on 3963 kc. W3BAI sends good news. W3CA is real traffic man. W3CA-W3WO-W4DW-W3AAJ keep 4-way schedule most every day, 12:30 to 1:15 p.m., E.S.T. W3CFL is building new transmitter. W3BJX is using '10s in place of '45s. W3BUY has two operators. W3RS wants ORS transferred from W1ACD.

(Continued on page 70)

• CALLS HEARD •

Horace Simonsen and Colin Knight, 23 Bomford St., Blenheim, N. Z.

7-mc. band

ac3lc ac8ay ac8go ac8js ac8my aulkab au7kah au7kao
etlah etlcb ear7 ear125 enold eu2kel eu6bh f8ej fm4ab fx7c
haf7k haf9r hb9e jldy jlee jlep jlek jlxw j3cm kalcem
kalhr kalpr ka4hw k8auq k6dvs k6hf okikd om1tb pk1ac
pk1xb pasjl pasmd splta vslad vs8ae vs5cy vu2jp vu2kh
vzx4x vplff vk2al vk2vc vk2qm vk2jk vk2hw vk2br vk2jp
vk2ek vk2ys vk2lj vk2kj vk2pp vk2ls vk2jm vk2hs vk2hg
vk2wd vk2ax vk2im vk2wa vk2ab vk3es vk3ek vk3ga
vk3lk vk3kx vk3aj vk3gj vk3zs vk3cp vk3ws vk4pk vk4yg
vk4as vk5ml vk5rw vk5mf vk5gk vk5gw vk5rh vk5ny
vk5my vk5xk vk6hd vk6mk vk6jh vk6js vk6ru vk6wi
vk6rl vk6mo, vk6nj vk6fl vk7jk vk7ge vk7bc wlbmx
w2aup w2aif w2ait w3bit w3ev w3bux w3la w4aby w5acd
w5aps w5amy w6eqa w6vq w6idf w6egj w6alu w6by
w6eyg w6cvh w6an w6dyn w6aao w6czs w6apd w6erm
w6efy w6atj w6bqc w6ctm w6bkm w7bbp w8ai w8eik
w8ayu w8bgt w8br w8adu w8bnt w8cdf w8bas w8bez
w9rh w9bvi w9bwy w9fur w9bly w9gez w9hij w9drq

3.5-mc. band

wlbmx wlmk wlpi wltly w2afu w2ec w3agd w3asw w3kxm
w3pu w3gs wigs w4ll w4pd w4wm w5azq w5hn w6alu
w6ary w6aor w6eal w6fhh w6aan w6ajp w6bql w6bnd
w6exg w6gfl w6bbe w6bgt w6brv w6bbm w6ffq w6rj w6bqb
w6esc w6czs w6ceg w6fhh w6ae w6clt w6dfr w6dqv w6dks
w6fan w6anc w6dps w6dgl w6ec w6efw w6fex w6eaf w6agg
w7agq w7awh w7gh w8azo w8eip w8pk w9bwj w9cb w9dea
w9dkf w9dvq w9evw w9eaz w9kbs w9spv w9hk

phones

w6ary w6abr w6cen w6ene w6cnk w6fe w6fed w6fer w9esi
w9gsu

W1HX, Norman H. Young, 11 Cross St., Malden, Mass.

(December 1st-14th)

7000-ke. band

cm8uf fx7c k4ug k4rj nnlnie obrt ti2fg vk2jh vk7ch w6acl
w6aem w6afy w6ahp w6ahu w6akx w6am w6ann w6aas
w6be w6bja w6bqp w6bgr w6bwn w6byj w6bzo w6cdv
w6cek w6cix w6cla w6eri w6eul w6eug w6eui w6evf w6evw
w6eva w6exw w6eyq w6dce w6dia w6dnh w6dpv w6dqv
w6dva w6ebg w6eep w6efn w6ein w6ell w6emk w6enn
w6eqb w6ewk w6ewt w6exq w6ezi w6fel w6ks w6li w6og
w6ob w6uc w6vb w6vq w6wx xlaa xlaix xlm xlu x9a
xl1aa xl1bn xl2bi xl2dv xl2gl xl3ah xl3aq xl3az xl3ce xl3cs
xl3ct xl4ao xl4ap xl4bg xl4bl

G6YL, Miss B. Dunn, Felton, Northumberland, England

(November, 1931)

7000-ke. band

fm4ab fm8eg fm8ih fm8jo cn8mj cn8mk frear149 cv5aa
xd4xdb kalhr xla1s xeu2lo aulad au7di au7kab au7kah
xau7cj xam4zi sulch un7pp vo8me yi2fu yi6kr z6gjm
zl3aq fnhn fnhs gx2tm ldka pl198 rarv rkaa uwp4 x7fc
xxrl dxlyj

14,000-ke. band

w1au w1bak w2arb w2bar w2bwp w2bhz w3bgg w7bce
w8ben w8bbl w8cte w8eui w8ace w9aln w9gfs fm8bg
fm8er fm8cup fm8eg fm8ih cn8mi es3ht pk1pk pk4aj
xsm4zi veldq ve2er vk2ix vk2tm vk5bo vk5wr vk6gf
vk6mu vk6rl vk6wi vo8an vo8me yi2de yi6kr xl2as z4fm
zau6w fxyc gx2tm x7fc xxlyj

W2CL, Harry F. Washburn, 333 Packman Ave., Mount Vernon, N. Y.

7000-ke. band

cm2jm cm2mm cm2wa cm6cp cm8uf cm8yb f8bt f8ps k6boe
k6cog k6dv k6faz kalhr lu2la ti2fg vk2hl vk2hs vk2ic
vk3bw vk3ek vk3ou vk3rg vk3tm vk3wl vk3za vk3zb vk3zz
vk4hr vk5gr vk5hj vk5pk vk5wj vk5xk vk6rj vk6wi vk7wi
zl2bi zl2fp zl2jk zl3ah

W6BME, Craig Burton, 4115 Supreme Court, Los Angeles, Calif.

7000-ke. band

w1abn w1eny w1mk w2aen w2aoy w2el w3hf w4ajj w4anm
w4atd w5abi w5akq w5akx w5azv w5boe w5bvc w5bvn
w5byn w5vj w7amf w7bcj w7bjs w7bck w8apo w8eik w8rj
w9agh w9auc w9beg w9evn w9erv w9evm w9fir w9gex
w9gue w9hhe w9hhz w9hz w9tq w9tgu w9tst

W1BUX, Douglas H. Borden, 77 Tenth St., Providence, R. I.

14,000-ke. band

cm2cf cm2mm cm2wd cm8of cn8mi etlgu d4aap ear16
ear96 earmc ei2b f8bs f8ex f8pq f8rj f8ax f8tv g2bm g2dx
g2ig g2yd g5bj g5by (fone) g5ev g5fe g5ml g5oc g5pp g5ey
g5wq g5yg g5yh g6ax g6er g6nk g6qb g6rb g6vp g6wy
g6yk hc2jm k4ug k5aa nylaa oa4s oh3na oh7nf on4ao
on4bs on4fe on4ft on4gn on4ij on4sk rx1aa ti2ags ti2fg
ti2tao clyb vk2ax vk2dm vk2lz vk2xo vk3nm vk4rj vk5bo
vk5wj vk6gf vo8aw vo8me vp2mo vu2dp z4fm fx7c kdvs
xlals

7000-ke. band

cm5ea cm8by cm8he cm8yb hi8x k4acf k4aop k4es k4rk
k5aa ti2ags vk2ba vk2br vk2cg vk2dm vk2je vk2nr vk2oc
vk2ok vk2af vk2tx vk2wa vk2xy vk2zw vk3bw vk3ek
vk3gj vk3gx vk3hm vk3jk vk3jt vk3ka vk3ls vk3ml
vk3mx vk3pp vk3rg vk3tm vk3wd vk3ws vk3yo vk3zw
vk3zy vk3zs vk4ah vk4ju vk4kh vk4mf vk4px vk4ek
vk4vj vk4wo vk5bo vk5do vk5gk vk5gm vk5hg vk5iv
vk5jm vk5jo vk5hr vk5mb vk5mf vk5ml vk5my vk5pk
vk5ra vk5xk vk5yk vk6ow vk6wi vk7ch vk7ew vo8a
vp2pa xlm xlfu xl2bh xl2cj xl2ch xl2gn xl3ce xl3es xl3ct
xl4bt

VK3EK, Ed. F. Kosseck, Belmont, Victoria, Australia

7000-ke. band

ac8js ac8zk aulkac au3ea etlaa etley daxdb ear98
ear144 f8ps f8es f8ak fm8lc f8vp f8rp hb9p hb9q haf3ap
ilraw kaug k6avl k6eme k6dvz k6ir k6boe k6etf k6ig k7ox
k7tf kalce kalcem kalhr kalhl kalsl kalkc kalpr kalfr
ok2op okikd om1fo om1tb om2ej om2tg pk1ab pk1lr
pk3bm pk4er pkacg paoqg ap1ec ap1bq ap1bt ap3dr valad
vs6ad vs6ag wlabm w1azy w2amd wzbw w2el w2ber w2ec
w2emy w3apn w3bhv w3bm w3chg w3op w3qp w4ajx
w4lo w5ao w5atf w5bbr w5fw w6adk w6ahz w6aku w6aor
w6apm w6bbe w6bbp w6bgv w6bht w6blx w6cae w6ceg
w6cip w6crd w6dgv w6dtt w6dwi w6dyp w6eak w6egh
w6ehy w6ffp w6ln w6rp w6tm w6wo w7aax w7ahx w7ath
w7azk w7bdu w7bdv w7bfg w7bja w7bmo w7dl w7ij w7vt
w7vy w8ano w8bak w8bit w8bcp w8bla w8ke w9det
w9des w9dgs w9dhh w9dl w9do w9drq w9dtt w9ef w9egc
w9frq w9giy x5z xtd6 vx4x

(Continued on page 84)

• I. A. R. U. NEWS •

Devoted to the interests and activities of the INTERNATIONAL AMATEUR RADIO UNION

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Vice-President: C. H. STEWART

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Wireless Institute of Australia
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Conducted by Clinton B. DeSoto

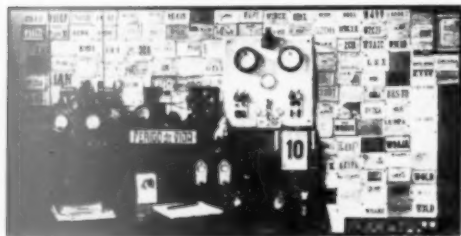
THE tendency toward serious examination of the day-to-day and month-by-month utility of our various amateur bands is growing strongly among nearly all the I.A.R.U. member-society experimental groups. Not only does there exist strong curiosity as to just whither this amateur radio is whencing, but also things are being done about it. In South Africa, for example, a couple of bold theorizers have held forth in "QTC" (S.A.R.R.L.'s official organ) for the past few months analyzing and correlating general stellar and cosmic phenomena in conjunction with solar conditions, all viewed in the

season. The R.S.G.B. has arranged forthcoming tests on 1.75, 3.5 and 28 mc., in addition to the B.E.R.U. contest in February which, however, is restricted to Empire stations only. The international Morse practices inaugurated by the Britishers during November are also of interest in this connection, being transmitted by selected English, Welsh and Scottish stations. These official practices commence at 0900 G.C.T. and conclude at 1300 G.C.T. every Sunday; each district is responsible for 30 minutes duty, with 10 minutes devoted to the 1.75-, 3.5- and 7-me. bands respectively.

The M.R.A.E., Hungary's short-wave amateur society, has also arranged a series of 28-mc. tests by four of its stations. HAF3D, HAD4D, HAF8B, and HAF8C are transmitting on this band every Saturday and Sunday at respectively 1500-1900 and 0700-1900 G.C.T. They call "CQ-ten" for five minutes at the beginning of every 30-minute period, and in the interim listen for replies on the same band. Reports on these transmissions, which are solicited, can be sent to the M.R.A.E. at the address given in the QSL Bureau list elsewhere in this department. Such is the direction taken by Hungarian efforts, while in South Africa arrangements are being considered for another "Springbok competition," at the suggestion of U.S. amateurs.

Plenty of activity promised everywhere, then. But in the meantime, let us give a little thought to the conditions existing in our bands during the autumn months just past.

In Germany, Dr. Curt Lamm reports conditions on all bands have improved considerably.



FROM HENRIQUE DE CASTRO IN BRAZIL COMES THIS PHOTOGRAPH OF HIS STATION, PY9HC

Two Type '10's are used in push-pull in the transmitter, supplied with 500 volts r.a.c. The address is Caixa 67, Uberlandia, Minas, Brazil.

light of radio wave propagation effects and present theories. Their results, while not dogmatic or presented as something Q.E.D., are provocative of careful thought.

For years the A.R.R.L. international contests, not to mention the domestic tests, have provided valuable if desultory information for such studies. Similar tests abroad are reaching a new high this

PK and other remote stations came through on 14 mc., although W's were rather weak. Seven mc., however, proved satisfactory enough, with VK and ZL contacts in the mornings, and even in the evenings, just like "locals." On 3.5 mc., of course, there was the now accustomed heavy European 'phone and code traffic, with W's being heard very well from 0200 to 0400 G.C.T. D4AFA puts forth the suggestion that amateurs on both sides of the pond endeavor to establish transatlantic contacts, and drop traffic and rag-chewing during those two hours this winter in favor of the more thrilling and fascinating foreign contacts possible on this band.

Several South African stations have been in constant contact with the U.S.A., according to Dr. S. H. Walters, ZU1D, mostly in the S.A.R.R.L. 6th division. This was on 7 mc., which band, according to OM Walters, is staging a welcome come-back. They are expectant that 14 mc. will also come back in a short time, and offer opportunity for again taking up old acquaintanceships made on that band. Personally, however, we think that the "Z's" would be better advised to try to reorganize those friendships on 7 mc., or even lower, at least for a few years to come. The possibility of handling traffic for the Olympic Games (discussed in this department of September, 1931, *QST*) is one of their principal objectives in this connection, providing officialdom gives the necessary permission.

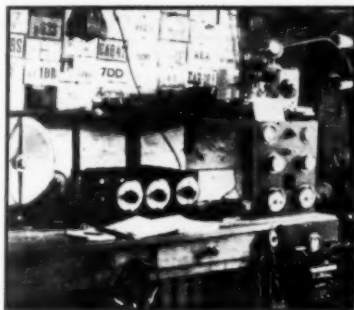
Phenomenal conditions were noted on the 7-mc. band during November and late autumn in Great Britain, with Australasia and South Africa being received almost daily. As against this, reports J. Clarrieoats, Hon. Secretary R.S.G.B., the 14-mc. band was practically dead. In connection with studies on wave propagation, G6CL wishes to draw attention to the recent issue of the Second Report of the Radio Research Board. This contains details of investigations carried out in the Heaviside layer. Atmospheric disturbances, standard frequency measurements and quartz oscillators are among the subjects which should interest overseas amateurs. The price is 2/-(50¢) from H. M. Stationery Office, London, or copies can be obtained through the R.S.G.B. at 53 Victoria St., London, S. W. 1, England.

Reception conditions in Italy during October found 14 mc. in excellent shape, with 7 mc. practically dead. During November this condition reversed somewhat but apparently not to the excessive degree noted in other European countries and elsewhere, particularly during the last of the autumn months. Perhaps the Mediterranean is still in love with the higher frequencies; at any rate, ZL, VK, and W (occasionally W5 and W6) came through on 14,000 for periods of a few days when nothing much was heard on lower bands.

The D.A.S.D.'s awaited Handbook is out! Called "*Kurzwellentchnik*," compiled of individual chapters on the various aspects of amateur radio by members of their technical staff, it is the source of much enthusiasm among German-speaking amateurs in all parts of the world. Many congratulations to the D.A.S.D. from this department on an FB production!

It is discussed fully in the present issue's "Book Reviews."

The new Belgian regulations, now in effect, are in almost every detail an exact replica of the European regional agreement adopted at The Hague in 1929, and reproduced in translation beginning on page 24 of the December, 1929 issue of *QST*. These regulations represent a considerable withdrawal of privileges from the Belgian



ON4UF, OWNED BY L. RICHARD, IS LOCATED AT 32 RUE CRESPEL, BRUSSELS, BELGIUM

The transmitter is push-pull TPTG, with 45 watts input at 430 d.c. volts. Receiver is usual screen-grid r.f., with one audio stage. ON4UF would be pleased to exchange photographs with other amateur stations.

amateurs and, according to advices from Belgium, will almost certainly result in a decrease in the number licensed stations in that country.

In future, cards for Belgian amateurs should be sent only to the R.B. QSL Bureau, whose address is given elsewhere in this department.

We are also informed that the present regulations in that country will probably form the basis of Belgium's proposals with regard to the amateur situation at the coming Madrid conference.

Horace D. Simonsen, ex-ZL2CZ, who now devotes his time to making receiving observations, and Wally Bowles, W6BHM, have inaugurated a novel "Call's Heard" scheme. Simonsen sends along lists of all the W stations he hears on 3500 kc., and this list is broadcast at intervals over W6BHM's "eighty meter" 'phone. The result is that stations listen for the informal broadcasts, and if they desire QSL confirmation, request a card from the Zedder by sending one of their own. It seems to work out sufficiently well to be a good stunt suggestion for other stations and listeners to try.

(Continued on page 68)

• CORRESPONDENCE •

The Publishers of QST assume no responsibility for statements made herein by correspondents.

Watch Those Harmonics!

173 Hall St., Spartanburg, S. C.

Editor, QST:

The operator of this station is also operator at a local aircraft station standing watch throughout the day on a frequency of 5840 ke.

During the past month or so, several amateur stations have been heard in the vicinity of this frequency calling other stations, giving long CQ's or testing. The usual procedure is to call one or two other amateurs, then one or two long CQ's. Finally when they receive no answer they test and hold the key down for long periods, trying no doubt to get just a little more current in the antenna. One WS was heard about noon, not long ago, coming in QSA5 RS. Several of the stations in our system heard him and all said he was QSA5. He followed the above procedure wondering, no doubt, why he couldn't get out all he was putting in his antenna.

It happens that the fifth harmonic of a transmitter set at this frequency will beat with the fourth harmonic of a receiver tuned to 7300 ke., or the eighth harmonic of one tuned to 3650 ke. So no doubt these amateurs are tuning their transmitters to harmonics of their receivers set on the 80-meter band.

Surely enough has been written about frequency meters and monitors in past issues of QST to enable any amateur to build one, and they certainly won't break anybody's pocket-book. Tuning a transmitter to a receiver harmonic is permissible if the amateur knows the approximate setting of his transmitting condenser dial to put him close to the allotted frequency bands, but when this setting is not known a frequency meter or monitor seems to be absolutely necessary.

— E. L. Sikes, W4AFQ

Frequency Tripling

Radio Station VE9GW, Bowmanville, Ontario
Editor, QST:

In the August issue of QST I noticed an article on frequency tripling by Boyd Phelps. The following information might be of interest to those desiring to utilize this method of raising the fundamental frequency.

At VE9GW we use a crystal with a fundamental frequency of 3936.6 ke. and feed this into an

841 tube which triples the frequency into an 865. This feeds into another straight amplifier at 11,810 ke. which in turn feeds a pair of 865's in push-pull.

At first we had trouble with the harmonic generator refusing to triple. It would double beautifully, however. We were using no bias on the crystal tube other than the bias that would develop across a 25,000-ohm resistor connected in the usual manner in the grid circuit, and this bias proved insufficient to produce much third harmonic component in the output of the tube. By biasing the tube through the 25,000-ohm resistor with approximately 35 volts of "C" battery, the third harmonic component was increased to a considerable extent and after doing this the third harmonic output from the 841 rose to a satisfactory value. There was a very pronounced plate current minimum when the tank of this tube was tuned to resonate at the third harmonic of the fundamental frequency.

This seems to indicate that it is first necessary to produce conditions in the crystal stage that will be favorable to the production of harmonics and that a tube doubling or tripling should be neutralized or of the screen-grid variety properly shielded, because it would seem that the third harmonic component developed in the tank of the crystal-controlled stage is the main source of excitation from which the so-called tripling stage develops its output.

We had planned to use one buffer amplifier after the tripler but the tripler did not deliver enough power to drive the Class C 100% modulated amplifier satisfactorily so another stage had to be added after the buffer in order to excite the 865's in push-pull.

From the foregoing one would deduce that in tripling, two stages should follow between the tripler and the output amplifier, supposing it to be two 865's or a 203-A, whereas in doubling, the doubler can be followed by a buffer amplifier feeding a pair of 865's or a 203-A.

It would appear that equipment for doubling the fundamental frequency twice is more easily handled and more economical to operate than to obtain the same frequency by tripling where the exciter stages use tubes of no greater power output than the 7.5-watt type.

— W. A. Shane, Chief Engineer

Quiet is requested—in listening periods of contest.

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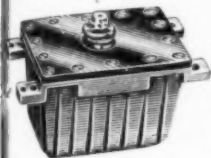


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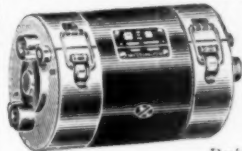
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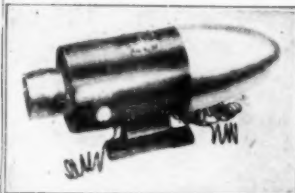


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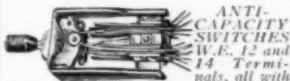


Edison Storage Battery Cells

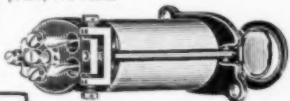


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Combined 'Phone and C.W.

5352 Eleventh Ave., So., Minneapolis, Minn.
Editor, *QST*:

For the past ten years I have been operating my transmitter in the 160-meter band. I have used other bands at different times, but have always had a transmitter tuned to the 160-meter band for reliable rag chews over short and medium distances. When working in this band I use c.w. or 'phone. If I am working a fellow and he can understand the 'phone without difficulty I usually use 'phone. But if he has to strain his ears to hear me or the 'phone fades I use c.w.

I can't recall that I have ever begun a QSO on 'phone which later faded where the c.w. would not get through with fair readability. A few years back a 'phone transmitter which could not be keyed was unheard of, but during the past three years about ninety per cent of the 'phone stations I have worked do not key their transmitters. I can't understand why they don't, because it is so simple to key a transmitter and the communication range of any transmitter is greatly increased when used for c.w. Of course if a buzzer or other tone signal is impressed on the modulating system no appreciable increase in range will result. At my station I have a double-throw switch which opens the filament of the modulator tube and short circuits the modulation choke and dropping resistor in the plate circuit of the r.f. amplifier. I have the key in the plate circuit with a click absorption circuit across it. For 'phone the key is kept closed by the small shorting switch on most telegraph keys. However, the 'phone circuit may be left normal for 'phone with only a key inserted in the plate or mid-tap lead, although some energy will be lost in the choke and dropping resistor. But even with this loss in the circuit I believe the range of any transmitter on c.w. will be twice that obtained on 'phone.

I am not presenting this idea as anything new but it may be helpful to some and it works out well here. It not only makes a transmitter more reliable from an operating standpoint but also gives a fellow some code practice. If I used 'phone exclusively I would be quite rusty on code.

—Fred W. Herrmann, W9BPK-W9BZR

The DX Hour

Editor, *QST*:

That letter from Mr. Lucas, ZU6A, struck me as being a mighty fine idea. No more, no less than the one of banning inter-W QSO's for a definite period of say, a week or a certain day of several weeks.

Think of the DX contacts that could be made by low-power fellows, as well as the high-power man. If we have a "W-contact" holiday that will amount to almost the same as having the DX in another band.

Of course, there are some who do not care for DX, but there are a mighty, mighty few who do not get a kick out of a DX contact or upon re-

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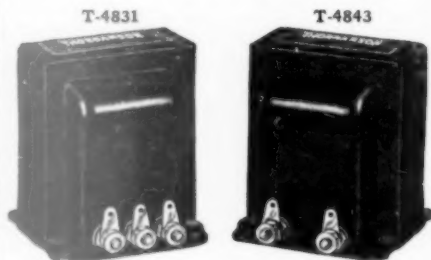
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ceiving a DX "heard" card. I do not think that a few hours of W Contacts would be lost if swapped for a few hours of DX. The traffic man on 3.5 mc. might be let alone as that band is not primarily a DX band, but I am sure that the gang on the 7- and 14-mc. bands would not object to such an agreement.

I recommend that one hour on Saturday and one on Sunday afternoon or evening, say at about dark, be set aside for DX. Those are decidedly the best DX days and they probably best suit the Americans too. Of course, the days and hours could be straightened out later, but the sooner the better. I, for one will not QSO any W's whenever those hours are set. As it is now I listen for DX at the DX hours instead of QSO'ing locals.

— Herrick Brown, W4ABR

I. A. R. U. News

(Continued from page 63)

British anticipation of the opening of the 3.5-mc. band to more general operation has at last been ended. Over date of November 12, 1931, the Secretary of the British Post Office communicated to the R.S.G.B. "presenting his compliments and desiring to say that in order to meet the views of the Incorporated Radio Society of Great Britain he has found it possible to arrange for the freer use of part of the 80-meter band of wavelengths."

Under the new arrangements, frequencies from 3520 to 3730 kc. are authorized to be used any time on any day during the months from October to May inclusive and at any time over week-ends from 3 p.m. on Saturdays to midnight on Sundays during the months from June to September inclusive. The use of the remainder of the band was withdrawn in return for this concession.

Of course, these frequencies are still restricted as to use by the general regulations applying to all bands in use by British stations, in particular to the time limitations on transmissions. But even so, and despite the increase in buffer widths, it is a good step for British amateur radio and should result in a notable increase in 3500-kc. activity. All the luck, G's, and long and good QSO's.

Guy Grossin, F8RJ, claims that the six-band WAC recently promulgated in these columns is within the reach of many European stations. For instance, in his own case, he has worked Europe on 56 mc., Africa on 28, South America on 14 and 7 mc., and North America and Oceania on all three principal bands. This leaves only one continent, Asia, which he feels confident of working on 1.75 mc. when stations operating on that band appear, and conditions improve a little more. He has already worked the U.S.S.R. on that band; parts of Asia are no farther. We hope it happens soon, OM!

Correlating corrections and additions to the list of QSL Bureaus of the world that have

(Continued on page 82)

YOUR MONEY BACK - IF NOT SATISFIED

RCA LICENSED TUBES

NEW 2V TUBES

NEW 6V AUTO TUBES

TRANSMITTING TUBES—UX210's—15 watt rating—\$1.50

All tubes unconditionally guaranteed ninety days against mechanical and electrical defects

69

Made for YOU! AMATEURS



This Special Ham Receiver

follows essentially the same circuit as the new NATIONAL SW-5 THRILL-BOX but is for head-set use only.

High Signal-to-Noise Ratio

The combined results of careful circuit design and the use of the UX 235 tube give an exceedingly high signal-to-noise ratio.

Real Gain in RF Stage

The tuned input to the RF stage and the lower plate impedance of the 235 tube makes possible a real RF gain — an exclusive feature of the SW-3.

Single Control

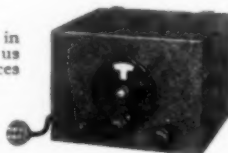
Although there are two condensers and two sets of coils, the SW-3 has genuine single control. Set and forget the antenna trimmer. Special HF Variables have insulated main bearings with constant-impedance pigtailed and are insulated with R-39. Tuning is with a genuine NATIONAL Velvet Vernier dial.

Band-Spread Coils Standard Equipment For 20, 40, and 80-Meter Amateur Bands Adapted to A.C. or D.C.

Made in full AC Model for use with NATIONAL type 5880 Power-Pack, specially designed for humless operation. R.C.A. Licensed. Made also in model using new 6 volt tubes. Type 235 and 237 for battery operation or No. 235 and 227 tubes can be used with 2.5 volts A.C. on the heaters and B batteries for plate current.

The Price Is Right

The price of the SW-3 puts it in reach of every amateur. Write us for full particulars and prices using coupon below.



NATIONAL SW-3 AMATEUR RECEIVER

National Company Inc.
61 Sherman Street
Malden, Mass.
Gentlemen:

Please send me full particulars and prices on your new SW-3 Ham Receiver.

Name

Address

QST-2-32

Communications Department

(Continued from page 60)

W3QN is Richmond's YL traffic op. W3TN has our sympathies. W3BSM sends real new station traffic total. W3BEV is Ole-Timer with new call. W3AEW is lining up crystal outfit. W3NE reports handling police message. W3AGY wants schedules. W3BSB reports regularly. W3ZA is still after them. W3AVR is new station on 3.5 mc. W3BSY has fine 'phone. W3BMO will be on 3585 after January 1st. W3AJA says 3.5 mc. not so hot. W3WM is itching to get on regularly. W3ZU handled amateur Legion Net Anniversary message. W3HJ is new station of Ole-Timer at Franklin. W3BAN is new station at Portsmouth. W3BGS reports trouble with power supply. W3BLJ is QRL work. W3AAV is new station call of Lt.-Comdr. Rogers of U.S.S. Antares, now at Norfolk. W3BZ's dog got a romp with receiver — hence a new one. Hi. W3BRY is forming club in Lynchburg. W3AMB will be on regularly soon. W3APT was heard in Moscow, Russia. W3BTM has been traveling. W3HL is experimenting with 'phone. W3AUG is adding Class B 'phone modulation. W3BRA is working day and night. W3CXM put 6 transcons into Calif. direct. W3EJ is fine op. at L. Field. W3NT sends nine reports on his section. W3BPB reports traffic regularly. W3BUR wants traffic. W3GY was QSO 40 states in one month on 'phone. W3BPA is after club prize 50-watter. Watch expiration date on ORS and shoot certificate to me so it can be renewed. Anyone wishing dope on ORS, write SCM, W3AAJ. Let's make 1932 best ham year ever. Use A.R.R.L. message blanks for deliveries. They are more reasonable than ordinary paper. Virginia Party on 3500 band every Sunday. 2 to 5 p.m. Join us and make your schedules over the air. Requests for Virginia Radio Bulletin should be mailed to W3AAJ.

Traffic: W3WO 656, W3AAJ 368, W3YD 335, W3AGH 308, W3FJ 203, W3BAI 162, W3CA 126, W3CFL 121, W3BJX 73, W3BUY 71, W3RS 40, W3QN 31, W3TN 27, W3BSM 22, W3BEV 20, W3AEW 11, W3NE 13, W3AGY 9, W3BSB 9, W3ZA 5, W3AVR 4, W3BSY 3, W3BMO 2, W3FE 2, W3AJA 1, W3WM 1, W3ZU 1, W3CXM 665, W3EJ 94, W3NT 82, W3BPB 12, W3BUR 7, W3GY 6, W3AUG 160, W3HL 16, W3BTM 10, W3BPR 12, W3BRA 3, W3APT 123, W3AMB 12, W3AQK 16.

ROCKY MOUNTAIN DIVISION

UTAH-WYOMING — SCM, C. R. Miller, W6DPJ — W6EXL joined the A.A.R.S. W6DAM has worked all districts. W7AWZ has a low power 'phone. W6BSE has two transmitters now. W6BTX still has trouble with QSP east. W6DWH took his portable, W6ZZT, to Idaho during the Christmas holidays. W1ZZA is snowed in. W7AAH says conditions are improving in Wyoming. W6APM wants a bigger and better transmitter. Hi. W7ADF in Casper, Wyoming, sends in a lot of FB news. W7ACG is having trouble with his '10s. W7AMU also has his troubles. W7BOV (ex-W9DIZ) is on the air in Casper. W7NY rebuilt everything. W6DPO says QRM from school. W6AHD is getting along well. W6EZZ is a new man in Cedar City. W6EWW rebuilt the shack and station. W6EYS worked eight districts in one evening. W6DPJ keeps a few schedules.

Traffic: W6DPJ 75, W6DAM 44, W1ZZA 32, W6EXL 31, W7AWZ 28, W6APM 11, W7AAH 9, W6BSE 8, W6BTX 5, W6DPO 4.

COLORADO — SCM, E. C. Stockman, W9ESA — The sad passing of Dr. William D. Reynolds is reported with heartfelt regret, and the amateur as well as the broadcast man has lost a dear friend. For the past few years "Doc" has devoted all his time to broadcast at KILZ, but he has always been a real ham at heart. ORS certificate was issued to W9GNK. New station at Alamosa is W9EBW. W9FYY is keeping regular schedule with K5AA. W9EXP changed antenna from Herts to Zepp. W9CND and W9EFP are rebuilding. W9CWA, W9FPZ, W9DNP, W9BJN and W9EAM report. W9APZ is looking for Colorado schedules.

Traffic: W9DNP 205, W9EAM 109, W9GBQ 91, W9GNK 60, W9FYY 52, W9ESA 29, W9CND 14, W9CWA 10, W9APZ 4, W9BJN 2, W9EFP 1.

SOUTHEASTERN DIVISION

ALABAMA — SCM, Robert E. Troy, Jr., W4AHP — W4RS leads the state in traffic. Anyone interested in joining the AA 'phone or CW nets please write W4RS. Mr. R. B. Sommerville, Selma, Ala. W4LT is on with 250 watts at Dothan. He has portable W4PCD. W4AUJ is

The "COMET"

The latest development of the HAMMARLUND laboratories.

SHORT WAVE
SUPER HETERODYNE

IDEAL for
THE PHONE HOUND

Write for descriptive folder
and special price

NEON TUBES

G-10 1/2 watt, 2" high, standard screw
base. Convenient for test pur-
poses. **55c**



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ISOLANTITE COIL FORMS

With knobs. The most effi-
cient coil form ever offered.
Low loss, for receiver or
transmitter.
4-5-6 prong type. Each **57c**

We can supply these wound for oscillator
or 210 buffer stages. Each . . . **\$1.00**

Mention wavelength desired

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HIGH VOLTAGE CONDENSERS
PRICES 60% OFF LIST

Type	Mfds	Rating	List	Special
TH-200	2	2000 V.D.C.	\$15.00	\$6.00
HP-200	2	3000 V.D.C.	32.50	13.00

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RELAYS



operated on two
dry cells, com-
pact, can be built
right
into the
set. Size
2 1/2" x 2 1/2"
x 2".
Prices:
Single
pole type
\$3.50
(for keying)

Double pole double throw. **\$4.50**
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(for use with Mercury Rectifier power
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NATIONAL SHORT WAVE EQUIPMENT AND RECEIVERS IN STOCK

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Completely engineered assembled transmitter
READY FOR WIRING, for less than the cost of a
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DON'T GET CAUGHT OFF FREQUENCY

CRYSTAL CONTROL assures absolute fre-
quency stability conforming with new regulations.

These units can be used with 3-210 tubes,
3-112-A's or any combination of these tubes. This
transmitter consists of crystal oscillator stage,
buffer or doubler stage, and output amplifier stage,
equipped with vernier dials, in handsome metal
shield cabinet. Can be used as a 210 transmitter or
as control unit to drive a 50 watt or 75 watt tube.
With 3 Readrite milliammeters. **\$29.50**
With 3 Weston milliammeters. **\$42.50**

When ordering mention the wavelength you wish
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NEW Short Wave Receiver

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Latest design practices, latest circuit, Screen
Grid R.F.—Screen Grid Det.—Pentode Audio



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Embodying complete band spread-
ing feature — permits spreading of
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Broadcast. Uses two 236, one 238
tubes. First come, first served.
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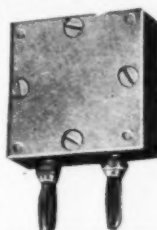
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Plug-in CRYSTAL HOLDERS

(DUST PROOF)

PRICE

\$2.50



Accommodates
crystals up to
1 1/4" square. Per-
fectly lapped
plates. Size 2 1/4"
x 1 1/2" x 9/16"
overall. This
holder will sat-
isfy the most
exacting user.

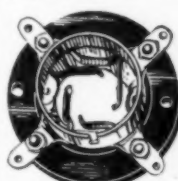
QUARTZ CRYSTALS, 80-meter band.
Guaranteed accurately ground on pre-
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Heavy porce-
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nickel-plated
shell, heavy
side wiping
contacts. A
beautiful job.
\$1.50

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assembled with slotted corner pieces.
Special sizes to order

Height	Width	Length	Price
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6"	7"	9"	2.25
7"	6"	10"	2.45
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cut absolutely square to any size
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Thickness	Price
1/32"	6/10c per sq. in.
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Give foolproof check on note and
stability. Hear your signal as the other
fellow does. Aluminum case, completely
shielded and self-contained batteries.
With A and B batteries for 230 tube.
Price (Tube included). **\$10.50**

COPPER TUBING Inducances Wound and ends drilled FREE

Inside dia.	3/16"	1/4"	5/16"
1 1/4"	7c turn	8c turn	12c turn
2 1/4"	7c turn	8c turn	12c turn
3 1/4"	10c turn	12c turn	14c turn

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Exclusive Eastern Distributors for

PURADYNE PRODUCTS

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Cat. No.	Out Put Voltage	Filament Voltages	Wattage	Price
80	2500-0-2500	—	850	\$13.00
50	1500-0-1500	—	500	9.00
40	1000-0-1000	—	—	—
10	250-0-250	—	500	7.50
10A	750-0-750	7 1/2 V. c.t.-7 1/2 V. c.t.	325	5.00
10B	600-0-600	7 1/2 V. c.t.-7 1/2 V. c.t.	—	4.00
45	375-0-375	2 1/2 V. c.t.-2 1/2 V. c.t. 5V.	100	3.50

PURADYNE filament transformers, 10,000V. insulation in metal cases with stand-off insulators. All guaranteed for one year against any defects. ALL CENTER TAPPED:
2 1/2 V. — 12 amps. for 860s \$3.50
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5V. — 20 amps. for 872s 6.00
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10V. — 7 1/2 amps. for 203As, 211s, 852s, 860s, 843s 4.00
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PURADYNE guaranteed transmitting filter condensers, metal cased with stand-off insulators. All condensers rated at a continuous working Voltage.
Capacity 1000 Volts 1500 Volts 2000 Volts 3000 Volts

1 mfd.	\$1.25	\$2.00	\$3.00	\$6.00
2 mfd.	2.00	3.00	5.00	12.00
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PURADYNE 200-watt center-tapped transmitting grid-leaks in metal case with stand-off insulators:

5,000	\$1.75	20,000	\$2.50
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PURADYNE Microphone Pre-Amplifiers using two No. 230 tubes in neat metal cases. \$7.50

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PURADYNE 175 K C superheterodyne intermediates in neat aluminum case, shielded95

Puradyne Copper Coils Prices per turn

Inside Dia.	3/16"	1/4"	5/16"
2 3/8"	.08	.09	.14
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THORNTON Fil. Transformer 1 1/2 V. 2 1/2 V. 5V. \$1.25

AMERTRAN Transformers 151 P.P. Input or 443 Output. \$1.25

Listed at \$12.00 each. Our very special price, each. \$4.50

High Voltage Cable, 10,000V. insulation, per foot.05

Single button receiving and transmitting microphones 3.50

R.C.A. 2 Henry 300 mils, 20-ohm key click and filter chokes. \$1.25

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Pictorial resistors, all sizes, \$1.10 each, dozen.85

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operating on 7 mc. W4ASM has a nice traffic total. W4KP is doing good work in AA net, ALN and Chicago chain. W4AG applied for ORS. W4AZE-W2BJF has installed his station in the Engineering Building at the U. of A. W4AKM was bitten by that malicious bug called "YL." Same goes for W4AHP. W4AZH is having receiver trouble. Welcome to W4BBO and W4BBU, two new hams at Dothan. Let's make a New Year's resolution to report each month.

Traffic: W4RS 119, W4KP 76, W4ASM 57, W4AG 28, W4AZE 4, W4AZH 1.

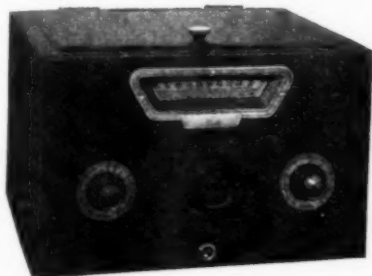
EASTERN FLORIDA — SCM, Ray Atkinson, W4NN — Zowie! Hang on to your hats, gang, cause you're going to read the biggest report that East. Fla. ever turned in. My hearty thanks for the excellent cooperation. Watch us grow! The Lakeworth Amateur Radio Club captures the first heat in the Wouff-Hong Trophy Contest with a club total of 862. Get dope on contest from your SCM. W4AWO makes BPL, followed by W4SK. Bet W4OK slept at the club. Hi, W4AKW, RM, takes third place. W4HY is still busy with GE sets. W4HE, Wally Battison, presented a Wouff-Hong to Mr. and Mrs. W4NN-W4AGB, W4AFN, W4OK, W4WJ, W4ASA and W4AQI really work like troupers in this club contest. W4DU had the Fla. 'phones standing by for the "Transcons." And here are W4WS and W4ABL, two traffic eating 'phones, and W4MF, another 'phone traffic man. W4UJ applied for ORS. W4AZB received an O.O. appointment. W4ACZ gets his ORS appointment. Many ORS tickets will have to be cancelled for non-reporting. If your ORS certificate is over a year old, please send it in to me for re-issue at once, or cancellation will follow. W4AS sure delivers messages. W4AKV sends power supplies west for amusement. Hi, W4VP continues to dig up a lot of station reports. W4OY and W4OK visited Daytona Beach. W4AKO sent in three reports for Tampa stations. W4BBB is new station in Lake Helen. W4AEM has work QRM. W4NE reports that Miami amateur stations will cooperate with the All-American Air Races using 250-watt control station. Great stuff. W4AKW won the Miami Radio Contest, followed closely by W4FZ and W4QF. W4PI steps into the traffic gang. W4LA is down for repairs. Hey, W4DT, where is the W.P.B. gang? Heard W4PAZ portable working DX. W4OQ reports first time from Orlando. W4OT is trying to make a traffic man out of W4AWS. Hi, Now fellows, just polish up the old specs. Give a look right under this essay; then roll up the sleeves, light a butt, grasp the key and start things spinning. 73.

Traffic: W4AWO 735, W4SK 113, W4AKW 97, W4AS 82, W4ASA 80, W4AKV 70, W4VP 61, W4PI 55, W4NN 54, W4FZ 50, W4OT 46, W4ABL 37, W4UJ 28, W4AZB 27, W4WS 22, W4WJ 21, W4MF 21, W4AQI 19, W4QF 17, W4FP 15, W4AGB 10, W4JO 7, W4HY 7, W4AFN 7, W4DT 6, W4GR 5, W4AEM 5, W4AKO 2, W4BBB 1, W4GS 63.

WESTERN FLORIDA — SCM, Edward J. Collins, W4MS-W4ZZP — Well, fellows, we have a station qualified for "WAC" at last. W4FV-W4ZZR worked a Jap this month giving him all continents. He spent the Christmas holidays in Illinois at his station W9AQ. W4KB turns in a FB traffic total. W4AGS-W4PCK is still getting FB DX. W4AQY is at last getting out. W4AXP keeps a daily schedule with W4KB. W4AAX has QRT radio. W4ACB-W4PCN bought W4AAX's station. W4QU has his little 'phone perking FB now. W4AXF also has her 'phone on. W4ASV is building a new transmitter throughout. W4QK is looking for traffic. W4ATN has a new push-pull rig. W4ARV is still knocking them out with his low power rig. W4ART was seen rebuilding his antenna. W4UW promises a greater traffic total next month. W4QR-W4AQG has been busy moving his 'photo studio. W4SZ is kept hopping at W. U. Rhodes of W4HQ says he will be on again after January 1st. W4AFT is now on with 'phone. SH-H-H we hear that there is going to be a new "XYL" at W4AFT. Congrats, OM. W4ASG is getting his station all prettied up for the Hamfest in Marianna. W4AUV has been sick. W4AUW has been building a new receiver. W4ALJ and W4ADV are home again after active Naval duty. The new call of G. R. of W4AFT is now W4ML. W4QR, W4ACB, W4ML and W4KB are planning a West Florida 'phone net for traffic. More power to you fellows. W4MX is ditching the YLs for 'phone. How come we never hear from W4AOO? W4ANQ is moving into Alabama. W4UAU says his U.S.N.R. group were slowed up by Christmas rush. W4SC continues to keep up its splendid work in the FNG net. W4MS-W4ZZP keeps 7000 kc. busy with a new TPTG outfit. W4ZZP is about 3

REL AMATEURS REL

Ten years of concentrated effort in the manufacturing of short wave apparatus, kits and parts has had its effect in the attainment of quality products — built to deliver the goods and to stand the gaff.



REL'S "278" Receiver is proving to be the ideal complete receiver for the Amateur Bands.

Band Spreading on Full Vision Dial. Each receiver individually calibrated, positively defining upper and lower limits of the 20-40 and 80 meter bands. Extra coils available for band spreading particular channels. Calibrated volume control. Selective, sensitive and with real Pentode punch. Screen Grid R. F. Type 36 Tube. Screen Grid Detector Type 36 Tube. Pentode Audio Type 38.

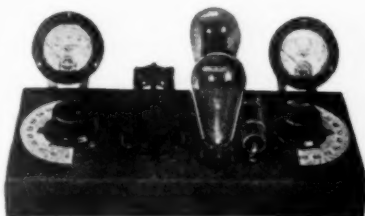
Slight changes make set adaptable for 2½ volt tubes.

List Price \$45.00

THE GLOBE GIRDLER

Any type of UX tube may be employed. When using De Forest 510 tubes an output of 30 Watts will be obtained. Furnished with one Grid Coil and one Plate Coil for either the 10-20-40 or 80 meter Bands — Mounting Brackets for Meters are supplied — Completely built and tested.

List Price \$17.50



A LOCK DIAL

Easy to replace your old dial and improve the appearance of your transmitter.

Die Cast Aluminum Dial will not tarnish — Markings are permanent and cannot be defaced.

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CLASS "B" MODULATION TRANSFORMERS

For Type 10 Tubes. As specified in Jim Lamb's article, Dec. 1931, Q.S.T.

Designed and built to meet the most exacting requirements.

Flat frequency response 60 to 5000 cycles providing properly matched tubes are used.

BUILT FOR THE HAM

Net Price \$8.30 per pair

Ask for REL Parts At Your Dealer's or Write Direct

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Cunningham RADIO TUBES

Radio's Motive Power Since 1915



C 239

Super-Control
Radio-Frequency Amplifier
Pentode

Operating Voltages

Ef — 6.3 volts (DC)
Eb — 180 volts (Max.)
Ec — -3.0 volts (Min.)
Ed — 90 volts (Max.)

AN addition to the automobile tube series, C 239 is recommended for use as a radio frequency amplifier, intermediate frequency amplifier, and superheterodyne first detector. Very effective in reducing cross modulation and modulation distortion over the usual range of received signals, its design permits easy control of a large range of signal voltages without the use of special local-distance controls.

The fifth electrode in this new pentode is called the *suppressor*, placed between the screen and the plate, and is connected within the tube to the cathode. It effectively eliminates the secondary emission effects which otherwise limit the voltage swing permissible in screen grid tubes if operated at low plate voltage, i.e., at or approximately equal to the screen grid voltage.

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Dallas • Atlanta

watts for week-end trips. Hi. A Happy New Year. Oms Let's make 1932 the best "Ham" year yet.

Traffic: W4ACB 79, W4KB 46, W4FV 42, W4AGS 22, W4AUW 14, W4ASV 9, W4ATN 7, W4QU 8, W4SZ 4, W4QR 11, W4AXP 8, W4AXF 6, W4AFT 10, W4AQY 3, W4UW 14, W4ARV 18, W4AAX 3, W4ALJ 1, W4ART 2, W4ZZR 4, W4ZZP 3, W4ASG 9, W4MS 37.

GEORGIA-SOUTH CAROLINA-CUBA-ISLE OF PINES-PORTO RICO-VIRGIN ISLANDS — SCM, J. C. Hagler, Jr., W4SS — W4SM-W4IR leads the traffic gang this month. K4RK, who sent in *all* dope from P. R. this month, is a close second; W4AMA is next. K4RK handled some important traffic last month pertaining to the illness and death of the Venezuelan Vice-Consul to the U. S. A. K4PCI-W2FN made a flying business trip to N. Y. K4RJ, K4UG, K4PH, K4LW, K4AAV and several future hams paid K4RK a visit. If you men in P. R., Cuba, and the V. I. want news of your activities in QST, you will have to send in the news to the SCM, direct to A.R.R.L., or to K4RK. CM8YB continues his good schedule work and turns in a good total. K4RY received a "heard" report from Siberia. W4QZ has 12 stations in his Georgia 'phone net now. W4CE is pounding brass in his home town, Dillon, S. C. W4SS has a small 1750 kc. CW outfit on the air. W4PM reports DX weather in Atlanta now. W4MO, Secretary of the Atlanta Radio Club, reports that a Hamfest and Weiner Roast was held on Stone Mountain with 46 men in attendance. W4WB wants Fla. schedules for traffic work. W4DV made a short trip to West Palm Beach. W4AAY spent a week hunting in the Savannah River swamps. W4HN is changing his QRA to Charleston, S. C., January 1st. W4ADD gets more power and a better note from 2 '81 M tubes. W4AZ and W4GY are active in U.S.N.R. work. W4ABS says that although they have always considered Ft. Benning a foreign country, the "U.S.A." on the SCM's card is not necessary. Hi. W4DL is operating the Tech. High station, W4YC. W4PE resigned as President of Atlanta Radio Club. W4AAY has a new MOPA. W4IS reports traffic and says W4BAT is new ham in Statesboro. W4AHG is CW outlet for the Ga. 'phone net in the A.A.R.S. W4KV is relief operator at W4SM. W4AEV is going to put up a 100-watt crystal rig for the 59th Inf. Brig. Hdq. N.G. in Macon. W4JJ just got married. W4PD lost his skyhook in a sleet storm. Let's resolve to report to the SCM each month in 1932. A Happy New Year to all.

Traffic: W4SM-4IR 236, K4RK 176, W4AMA 157, W4QZ 62, W4CE 46, W4SS 39, W4PM 38, W4MO 33, W4JD 32, W4ACQ 30, W4WB 28, W4MA 24, W4DV 24, W4AAY 23, W4HN 21, W4ADD 21, W4GY 18, W4AON 12, W4AFQ 12, W4ABS 12, W4DL 11, W4IU 8, W4UT 6, W4WQ 4, W4BW 3, W4GB 4, W4KX 4, W4ACR 1, W4AUT 1, W4AEV 2, W4AU 41, W4IS 55, CM8YB 86.

WEST GULF DIVISION

NEW MEXICO — SCM, Jerry Quinn, W5AUW — Well, gang, wish me luck. I'll sure need it to do as well as our last SCM. Address all correspondence to Jerry Quinn, 524 West Coal Ave., Albuquerque, N. M. W5AJR is very QRL with an expired license. W5AIE-W5ZZA has moved to Denver. W5AOE is on 14 mc. now. W5AOD is a new ORS, and New Mexico Trunk Line station. A new ham is reported in Albuquerque, W5AOP. W5ZM is on again. W5AUW is trying to get some reliable schedules.

Traffic: W5AUW 336, W5ZZA 4, W5AOE 3, W5BRV 1, W5AOD 229.

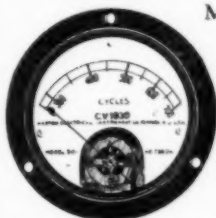
NORTHERN TEXAS — SCM, Roy Lee Taylor. W5RJ — W5AUL is running off with all honors of late and is sure handling the job of Route Manager. W5WW is back in the harness. He reports W5CDG, a new one there. W5CF is hitting the key hard these days. W5RH expects to make the BPL next month. Remember the Handbook offered by W5AUL to first station to make BPL! W5BSY reports working 'phone from the college station, W5AAN. Hemley of W5BNO-WBAP fame is stepping high now. W5BII in the capacity of Assistant Route Manager is ready to help the gang with schedules. W5AID is doing big things. W5AAD comes through with a nice report. W5AUN is doing his share down Abilene way. The W.F.A.R.C. is as active as bees, it seems, with the following handling traffic: W5BJX, W5AYX, W5AVA and W5AGE. W5AAO is tickled with his new National SW3DC. W5AL is trying to establish schedule with K6EBR, who lives at Greenville when not in Army. W5ANE is a new ham at Greenville. W5AGH of Caddo Mills is also a beginner. W5ARV is blowing out everything he gets. W5JA reports by radio via W5AUL. W5AVF re-

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HEADQUARTERS

Everything for the "Ham"

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Weston Meters \$2.50
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Navy type, CV 1030 Frequency Meter, 0 to 700 cycles. Can be made into a DC milliammeter for any range above 25 MA, by removing 1 ampere shunt.

Dubilier Transmitting
Condensers



Regular Price \$65

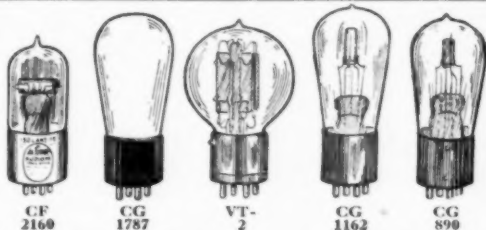
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Special Price... \$3

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Used by the
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Navy
Will not stretch
nor corrode

100 Feet 25c
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CF 2160—Short wave receiving type, Isolantite base—Filament 2 volts, 1.1 amperes. Each 35c
CG 1787—Receiving type. Filament 3.65 volts, .65 amps. Each 10c
VT-2—Western Electric, 5 watters. Transmitting type. \$1.00
CG 1162—Five watt transmitting tubes, 7½ volt Filament 50c
CG 890—Receiving tubes. Filament 3.5 volts, 1.05 amperes. 10c

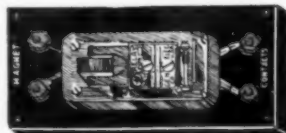
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Power
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3 for 25c



General Electric
RELAYS \$2

Type HG
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DUBILIER Mica Transmitting Condenser



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MICA
1750-volts
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8500 volt \$1.25



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SWITCHES 60c

SPST 60 Amp., 250 Volt
Mounted on bakelite base.

Magnavox Anti-Noise Transmitter

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With
head
straps
Single
button
100
ohm
mike



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Mica Condenser



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volts
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Ward Leonard Trans. Grid Leaks No. 507-68 for 245.....1.14
Ward Leonard Trans. Grid Leaks No. 507-51 for 204-A.....2.00
Ward Leonard Bleeders No. 507-65 — 25,000 Ohms.....1.14
Universal Microphones and Transformers—SPECIAL

Prices for brief time only!

Universal Microphones, Model A Single Button.....8.25
Universal Microphones, Model BB Double Button.....13.97
Universal Microphones, Model KK Two-Button.....27.45
Universal Microphones, Model LL Two-Button.....39.40
Universal Baby Mikes, "Q R Q".....2.65
Universal Baby Mikes, Switch Type and 25 ft. Cord.....4.15
Universal Handi-Mikes—Single Button.....5.70
Universal Handi-Mikes—Double Button.....8.50
Universal No. 1152 Matching Transformers.....6.99
New Ce Co 866 Tubes RCA Licensed—Guaranteed.....3.65
NEW RCA Licensed Tubes—Every tube guaranteed—
Types: 210 @ .99, 250 @ .99, 281 @ .99, 245 @ .50, 233 D.C.
Pentode .95, 236 @ .95, 237 @ .85, 235 @ .75, 222 D.C. @ .85,
247 Pentode .65, 238 @ .95

New 230 or 231 Tubes—Very Special......79
New 232 D.C. Pentode, RCA Licensed.....1.09
New Sparton Type Tubes—guaranteed—S82B, S83, S84 and
S85.....each .97
Lent's Improved Automatic Alcohol Soldering Torches......87
Cardwell Transmitting and Receiving Condensers—Prices
Very Special

Jewell and WESTON Meters—all models—Very Special
Genuine—NEW—Cunningham Tubes...40 and 5% off list.
Tung-sol 8 mfd. electrolytic condensers......32
Extra heavy porcelain stand-offs—2½ in. \$1.00 Doz.

New National S.W. Receivers in stock.....1.00
Sangamo 500 volt Conds. .0001, .00025, .0005, .001, .002.....1.00
Victor ABC Power Transformers—guaranteed.....1.75
Victor Condenser Blocks—guaranteed.....1.75

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BMS "Speed Bug" Adopted by U. S. Signal Corps.....8.95
Jewell Meters: 3-10-15-25-50-100-150-200-250-300-500 Mill
Amperes.....each 5.15
RCA, Model 106 AC Dynamic Speakers, in cabinet—in original
cases—from factory.....\$19.85

New Willard AB Eliminators—6 volts on A, 180 volts on B—
in original cartons.....\$16.90
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suppressors, condenser, tubes, Utah dynamic speaker—no
drilling required—list \$69.50—our price.....complete \$39.75

"Wirohm" 10 watt wire wound Resistors 1 to 10,000 ohms incl.
25 each; Over 10,000 to 25,000 ohms incl. 25 each.
245 type Marathon tubes—every tube perfect......29
Electrod parts—Prices very special—this month only.

Tung-sol ½ mfd. Tubular Condensers......19
100 ft. No. 12 Enameled Solid Copper Aerial Wire......60
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GULF RADIO SCHOOL

844 Howard Ave. New Orleans, La.

ports new TPTG rig perking FB. W5ANU finds it too cold
to DX. Hi. W5AXK comes through with traffic report.
W5AZC has schedule with W5AAC daily. W5BUH is finish-
ing up a new receiver. W5BAM is discontinuing operation
for some time. W5IRJ is installing a new water-cooled tube.
W5BIV reports his '12A is strutting its stuff. W5BXW is
still rebuilding crystal rig. W5QU is at A-M college operating
W5AQY. W5BUA will be on at the State Capitol after the
first of the year using W5CBQ. W5AJG of Dallas is back
with us after an absence of several years. W5LY is STILL
rebuilding. W5BTU has changed to crystal. W5AWT re-
ports things OK over his way. W5BAD, Former RM, of
North Texas is on using W5AJS at El Paso. W5NW-
PK5NW (Soupy), our old friend Groves, is back in the states
again and is located at Neches, Texas, 15 miles from Jack-
sonville, and will be on the air by the time this is printed.
W5BEN-WDAG reports for the Amarillo gang. W5QE is
working plenty DX now. W5ALK has a midget transmitter.
W5AW will soon be on with '10 in PP. W5AJX is having fine
time with his '10. W5WX is playing with 'phone. W5APT
is off the air for a while. W5VD is on occasionally. W5APH
is installing 75-watt crystal. W5BEN has plenty of spare
time after he quits work at WDAG.

Traffic: W5AUL 208, W5WW 176, W5CF 95, W5RH 72,
W5BSY 67, W5BNO 66, W5BII 49, W5AID 46, W5AAD
43, W5AUN 33, W5AYX 34, W5AVA 16, W5BJX 10,
W5AGE 1, W5AAO 19, W5AL 19, W5ARV 8, W5JA 7,
W5AVF 6, W5AXK 2, W5AZC 10, W5BIV 2, W5BUH 9,
W5RI 17.

SOUTHERN TEXAS — SCM, H. C. Sherrod, Jr.,
W5ZG — And still the number and quality of reports con-
tinue to increase! New Route Managers are W5BKE and
W5CT. Communicate with them for schedules. W5ANW is
now our Official Observer. The membership of this section
is especially requested to listen for the call pirate signing
the call letters W5ABQ. The right to these call letters be-
long to Morgan, 2501 Buena Vista Street, San Antonio.
Get the necessary information and evidence, fellows, and
turn same in to your SCM. One or two more Official Ob-
servers are badly needed. Are there any stations in our
Section regularly working that are located between San
Antonio and El Paso? If so, communicate with the Route
Managers for schedules. In the future the Route Managers
will make recommendations for appointment as ORS and
all applications for such a position for same must be sent to
the Route Manager for indorsement. Houston: W5TD is on
7 and 14 mc. W5AFV has been amusing himself lately with a
low-powered 'phone. A newcomer who is very welcome is
W5ADZ. W5AXH is now representing Houston with a
3.5-mc. 'phone. W5ANW is another sufferer of a call pirate.
W5BHO is on 3.5-mc. 'phone. Corpus Christi: W5MS has
returned to Corpus and is erecting new masts. Missed
W5BKJ's report this month. Kerrville: W5BKE, the new
RM, is keeping things humming. W5BSF has a hundred-
watt crystal rig. W5BKZ is hitting the high spots. San
Marcos: W5APM is one of our most popular 'phone stations.
Austin: W5CT, Route Manager, has been quite busy lately
with A.A.R.S. work. W5CCZ is the portable call of W5CT.
W5ATW is at the mike. W5BXH is on 1.75 mc. W5BWQ
is using crystal-control 'phone. W5BB and W5VV have con-
solidated. W5BZF wrote Santa Claus for a new '03A.
W5AI was formerly W2AXG of Bronx, N. Y. W5BDA has
closed account of school QRM. W5AON is trying to make
tuned R.F. in receiver tune. W5AGV is a new ham. W5OV
has portable call W5AIG. W5GZ has portable call W5AHU.
Bryan: Hutcheson, Secretary of the A. & M. College Radio
Club, is the sole representative. W5AQY has the new 500-
watt rig going. Port Arthur: W5YH reports by radio.
W5BUX was heard in South America. W5AZS is on low
power. W5CCT and W5BKF are new hams. W5YH handled
one of the westbound transcons. San Antonio: W5CCF is
busy with mid term exams. W5VL is on 7 mc. W5CS has
been moving to new location. W5AUC is waiting for power
and time. W5ABQ has a new C.C. 250-watt. W5BYG is
on with his '01As. W5BWM is the power behind the low-
power 'phone W5CD. W5CBW does not get on often.
W5EG was a visitor in S.A. recently. The SAJC recently
threw a big Mexican supper and gave away many nice
prizes. (Es lastima que no pueda enojar este asunto con vds.,
amigos mios) W5RV is on most evenings. W5OW is on
day and night. W5MVN is on daily. W5JC is moving.
W5CAS gets PDC reports. W5CAP is getting started with
low power. W5BQH is rebuilding receiver. W5BUV finds
time to play an occasional game of chess with W5CS.
W5EU is on quite a bit. W5BKI will be on shortly with a



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THE PERSONAL EMBLEM. A handsome creation in extra-heavy rolled gold and black enamel, $\frac{1}{2}$ " high, supplied in lapel button or pin-back style. The personal emblem has come to be known as the sign of a good amateur. It identifies you — in the radio store, at the radio club, on the street, traveling — you can spot an amateur by it. Wear your emblem, OM, and take your proper place in the radio fraternity. Either style emblem, \$1.00, postpaid.

THE AUTOMOBILE EMBLEM. $5 \times 2\frac{1}{2}$ ", heavily enameled in yellow and black on sheet metal, holes top and bottom, 50c each, postpaid.

THE EMBLEM CUT. A mounted printing electrotpe, the same size as the personal emblem, for use by Members on amateur printed matter, letterheads, cards, etc. \$1.00 each, postpaid.

THE "JUMBO" EMBLEM. How about the shack wall or that 100-footer? Think of the attention this big yellow-and-black enamel metal emblem will get! $19 \times 8\frac{1}{4}$ ", same style as Automobile Emblem. \$1.25 each, postpaid.

**The American Radio
Relay League
West Hartford, Conn.**

FB 'phone. W5UX says little doing just now. W5MN schedules with W5WW, W5BKE and W5VQ. W5MN wants a bi-weekly schedule with El Paso. Uvalde: W5AAZ, another newcomer, is an Army Amateur station. He is instructing another YL, Miss Marion Roberts, who will shortly be operating at W5AAZ.

Traffic: W5AFV 2, W5ADZ 11, W5TD 5, W5CT 247, W5BKE 209, W5APM 8, W5AQY 72, W5YH 152, W5CS 14, W5BVG 19, W5ABQ 15, W5BWM 21, W5UX 7.

OKLAHOMA — SCM, Wm. J. Gentry, W5GF — W5ABZ and W5AKX make their first reports. W5BPM has a couple '10s in Hartley. W5VQ is the main traffic station in Okla. W5TW has a crystal rig. W5ALD reports a new crystal job coming up soon. W5ALJ is a new station at Picher. W5BRD is coming on the air soon. W5GF is having some fun getting the 3500-ke. 'phone on the air. Hi. W5BMU is improving with traffic. W5WR has a new National SW-3. W5NF is building new AC receiver. W5BOR is back in Tulsa. W5GW is working an MOPA job. W5AYF is handling some traffic. W5AYK is waiting for his operators licenses. W5AAQ, a new man in Oklahoma City, reports for first time; he is handling traffic and working good DX.

Traffic: W5ATB 18, W5PL 42, W5VQ 1068, W5TW 207, W5BMU 118, W5ALD 60, W5ALJ 20, W5BOE 15, W5GF 9, W5AAQ 12, W5WR 5, W5NF 10, W5AYF 4, W5BEE 4.

CANADA

1932 starts off on the right foot. SCM reports have been received from every Division in Canada and Newfoundland. Grand total of traffic handled — 2370. SCM Bishop of Ontario deserves a great amount of credit for the wonderful showing made by his Division. VE3GT turns in another fine total of 886 and sets a fine example for us Canadians to shoot at. Let us set a new high in Canadian traffic this year.

Don't forget the annual Directors' Meeting to be held at Hartford early in May. Now is the time to send me your comments and ideas so that they may be presented for consideration at that meeting.

CANADIAN GENERAL MANAGER

ALEX REID, VE2BE

MARITIME DIVISION

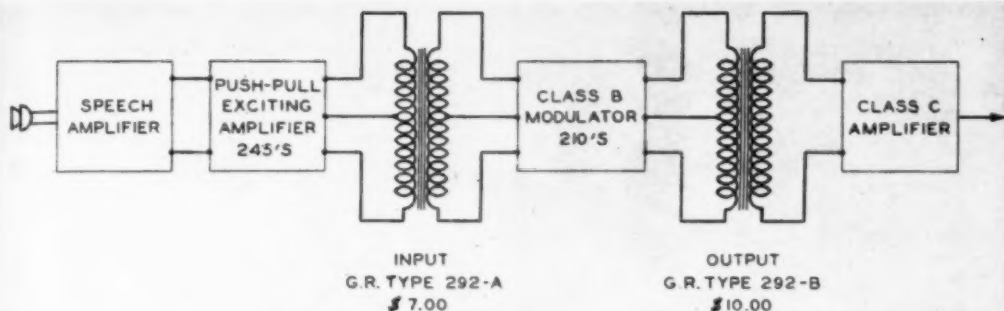
NOVA SCOTIA — SCM, A. M. Crowell, VE1DQ — VE1BV is highest traffic reporter. VE1BW sends in an interesting report. VE1CV is new ham in Summerville. VE1AG has received permanent ticket. VE1CA has returned to the air. VE1BN has also been getting out well on 3.5 mc. VE1AX expects to be on by the time this is read. Two new men in HALIFAX expected on shortly are VE1DH and VE1DL. VE1BY is getting out FB on 14 mc. VE1BV's call omitted from last report. VE1DQ says 14 mc. is getting FB again. VE1AE handles Maritime end of "Maritime-British Columbia" Trunk Line. NEW BRUNSWICK via radio VE1CL-VE1AG-VE1DQ. Three new men on in Moncton are VE1DC, VE1CX and VE1CY. VE1CL, ole "Canadian lumberjack," is still organizing six-way hook-ups.

Traffic: VE1BV 52, VE1BW 13, VE1DQ 8.

NEWFOUNDLAND — Acting SCM, James Moore, V08AW — V08Z keeps daily schedule with V08WG in Labrador. V08AE also keeps two or three schedules. V08MC is pounding away. V08AN is also very active. V08Z, V08AW and V08AE have been doing some very fine work on 3500 kc. VE stations are requested to keep a lookout for VO stations on the 3.5-mc. band.

ONTARIO DIVISION

ONTARIO — SCM, H. W. Bishop, VE3HB — Here's wishing all a Happy New Year. A hamfest was held at VE3GT's QRA with 36 attending. VE3GT again leads the section in traffic with some total. VE3GP is QRL helping new hams. VE3WF is a sample of his product. VE3AA says traffic is picking up. VE3AU is a new OBS. VE3CD says 3500 kc. is a flop. VE3BC is QRL at VARSITY. VE3IR has rebuilt. VE3FE is a newcomer. VE3IH and VE3HV are rebuilding. VE3TT is QRL with exams. VE9AL is QRL. VE3GX reports after a long silence. VE3ZZ did good work in the transcons. VE3DB is having good luck with 1750-ke.



QUALITY TRANSFORMERS FOR THAT CLASS B MODULATOR

HIGH quality, 100% modulation, with lots of output power is easy with a Class B modulator like the one described in the December **QST**. The General Radio TYPE 292 Transformers are designed and built especially for this service. Copper, iron, and insulation are used in sufficient amounts to insure long-time performance. Each output transformer, for instance, is tested at 4000 volts DC between windings and between each winding and core.

Send your check or money order for \$17.00 and we'll pay the postage to any point in the United States or Canada. Immediate deliveries from stock. Order now.

GENERAL RADIO COMPANY CAMBRIDGE A MASSACHUSETTS

Pacific Coast Warehouse 274 Brannan Street, San Francisco

HYTRON 866

NEW CONSTRUCTION

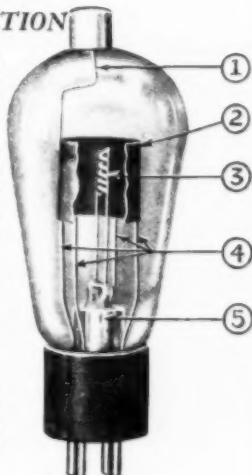
1. A heavy support wire sealed in glass at top of bulb, holding plate in proper alignment, also acting as plate terminal.

2. New cylindrical carbonized plate which entirely surrounds filament insuring maximum rectification and greater heat dissipation than the former types.

3. New Spiral Coiled filament designed to give high electronic emission and long life.

4. Four heavy wires which support plate in proper position.

5. Heavy nickel band surrounding stem on which plate supports are welded acts as a foundation for entire construction.



List Price \$7.50

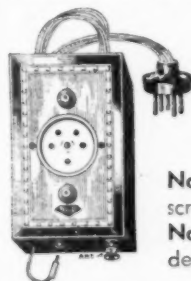
Fil. Voltage 2.5 Fil. Amperage 5.0
Max. Peak Inverse Voltage 5000
Max. Peak Plate Current Amperage 0.6

Special discount to amateurs

HYTRON CORPORATION, SALEM, MASS.

BUD . . . POLICE THRILLER

Experience the thrill of listening to Police Calls, Riots, Fights, Amateur Stations and Aviation reports.



Fits any electric radio
... easy to install.

Only \$3.50

No. 2401 for sets using
screen grid detector tubes.
No. 2701 for sets using 27
detector tubes.

BUD RADIO INC.

1923 E. 55th St.

Cleveland, Ohio

Enclosed find \$3.50 for (Type No.) or (Type
No.)

Please mail descriptive literature.

Name

Address

1932 SPECIALS

COLUMBIA MONITOR. Accurately Calibrated. Completely shielded in aluminum case. Equipped with Vernier dial. Three coils supplied for 20, 40, and 80 meter bands. Complete with tube and batteries **\$9.00**



RCA licensed TUBES

Real good tubes, made to stand the gaff. Unconditionally Guaranteed for 90 days!

UX112A.....	55c	UX226.....	45c	238.....	90c
UX120.....	70c	UY227.....	45c	240.....	90c
UX171A.....	55c	230.....	70c	245.....	50c
UX199.....	65c	231.....	70c	247.....	85c
UX199.....	65c	232.....	85c	250.....	1.45
UX201A.....	45c	233.....	90c	551.....	85c
UX210.....	1.35	235.....	85c	280.....	50c
UX222.....	1.10	236.....	90c	281.....	1.25
UY224.....	60c	237.....	75c	860.....	2.95

WESTERN ELECTRIC — 211E, 50 watt tubes. New. Guaranteed..... **Special \$8.00**

SPECIAL — The only practical mercury vapor 280 tube yet produced. Guaranteed..... **\$2.49**

COLUMBIA POWER TRANSFORMERS

A quality line of transformers. All mounted, with leads brought out to lugs on terminal boards. **Guaranteed for One Year!**

Type	Wattage	Voltages	Price
A	200	600-0-600, 7½ ct. & 7½	\$3.75
B	250	750-0-750	4.95
C	350	1000-0-1000	7.00
D	500	1500, 1000-0-1000, 1500	9.35
E	800	2000, 1500-0-1500, 2000	12.85
F	250	750-0-750, 7½ ct. & 7½	5.75
G	400	750-0-750, 7½ ct. & 7½ ct	7.45
H	150	350-0-350, 5, 2½ ct, 2½ ct	3.75
K	100	285-0-285, 5, 5 ct, 2½ ct	3.45
M	150	400-0-400, 5, 2½ ct, 2½ ct	3.95
N	150	300-0-300, 5, 1½, 5 ct, 2½ ct	3.75
R	750	2500, 1500-0-1500, 2500	14.35

STAND-OFF INSULATORS, similar to General Radio. Each — 10c, Dozen — 85c.

COLUMBIA FILAMENT TRANSFORMERS. An efficient, sturdily constructed job. All secondaries center-tapped. Deduct 10% from these prices if no center tap is desired. **10,000 VOLT INSULATION!**

Voltages	12 watts	25 watts	50 watts	100 watts
2½	\$1.25	\$1.95	\$2.50	
2½ & 2½	1.50	2.25	2.75	\$3.75
7½	1.25	1.95	3.25	4.45
7½ & 7½		2.25	3.95	4.95
10			3.40	4.50
15			3.25	4.00

ELKON BONE DRY ELECTROLYTIC CONDENSERS. 500 peak voltage. 8 mfd. — 75c, 4 mfd. — 60c.

GENERAL ELECTRIC POWER TRANSFORMERS. 150 watts, supplies 750 volts, center-tapped. 5 volts, and 2½ volts. Excellent for 245 transmitters..... **\$2.35**

GENERAL ELECTRIC 30 henry, 150 mill chokes, **\$1.50.**

COLUMBIA 30 henry chokes. Very efficient, ruggedly built. Mounted. Special, 200 mills, **\$2.40**; 120 mills, **\$1.30.**

Send for our new catalogue. It's free!

TERMS: Cash or C.O.D. No deposit required.

COLUMBIA SPECIALTY CO.

925 Westchester Avenue

New York, N. Y.

Get Started in RADIO

Write for free booklet telling about this growing and most promising industry. The radio operator is an officer aboard ship. His work is light, pleasant and interesting. He has many opportunities to travel to all parts of the world. You can qualify in a short time in our well-equipped school under expert instructors.



A new course in TELEVISION starting soon

Full information on request

Educational Department

WEST SIDE YMCA 4 West 63d St. New York

'phone. VE3SA has changed to MOPA. VE3IX is looking for Northern hams on our Sunday VE QSO party on 3.5 mc. VE3HA is disgusted with zepps. VE3HY very kindly sends in a report from the north country. VE3ET has been heard from his new QRA. VE3BG and VE3HW are on with a 50-watter. VE3AA and VE3HY handled some traffic. OLD VE3CE is no more: the new call is VE3PN. VE3DW reports a new ham, VE3PT. VE3IO comes through with his first traffic report. VE3CP is getting PDC reports. VE3AD is using flea power. VE3SI is lining up schedules. VE3HB has a new MOPA.

Traffic: VE3GT 886, VE3GP 123, VE3ZZ 109, VE3IR 101, VE3AU 75, VE3CD 78, VE3GX 63, VE3DW 55, VE3SI 38, VE3CP 36, VE3DB 31, VE3HB 31, VE3HY 29, VE3AD 22, VE3IO 21, VE3BC 18, VE3IX 8, VE3WF 11, VE3GK 12, VE3HV 8, VE3TT 8, VE3AA 5, VE3SA 2, VE3RV 2, VE3PT 2, VE3AL 1.

QUEBEC DIVISION

QUEBEC — SCM, Alpha L. Blais, VE2AC — The air is full of traffic when VE2BB, VE2AP and VE2AC keep their daily morning schedules. VE2BB has schedule with W1BOF, VE3GT and VE2AP. VE2AP schedules VE2BB and VE2AC. The latter schedules W1ATF. Thus we have a fair route for Canadian traffic. W1BOF schedules VE1AE. VE2CA has been busy turning out fountain pens. VE2CI's '81s went west. VE2DR, a new ham, is doing nicely. VE2CO, VE2AR, VE2CU and VE2EM are our "Knights of the Mike." VE2CX has been building an MOPA. Many tests will be going on next month. Please get busy and take part in as many as you possibly can. The New Year is with us. Now's the time to make resolutions for 1932. Watch your frequency. VE2AP is Official Observer now. May 1932 bring to all the fulfillment of their wishes and may their dreams of DX and high totals come true.

Traffic: VE2AC 104, VE2BB 66, VE2AP 58, VE2CX 8, VE2CU 6, VE2CO 5, VE2EM 3, VE2DR 8.

VANALTA DIVISION

ALBERTA — SCM, G. F. Barron, VE4EC — VE4DT reports schedules with VE5EM and VE5EB. VE4HQ has a nice traffic total. VE4GD sends in a peach of a report. VE4CY and VE4GD are using CC. VE4JI is having difficulty making a pentode pentode. VE4DX is on CW. VE4IT is re-vamping. VE4JC and VE4GP are getting out well. Mrs. VE4IX is very active. VE4HM sure does break through with his CC rig. VE4EA is foolin' around on 14 mc. VE4EC has junior op. What's the matter, VE4EI? No see, no hear... VE4EW has very FB 'phone rig. Let's get behind each other and get some more dope in for next month. Season's Greetings to you all.

Traffic: VE4DT 19, VE4HQ 12, VE4FR 2, VE4HM 1. **BRITISH COLUMBIA** — SCM, J. K. Cavaleky, VE5AL — We shall soon be deep in the "M.P.W." contest. I would ask all amateurs contacting VE5e during February to be sure and QSL as it may mean points to the contestants. VE5AG is having a struggle with weak batteries. VE5FI contemplates a move. VE5MI has crystal and VE5AM is about to bud out with one. VE5EW and VE5FH are making plenty of noise. VE5HR is handling most of the traffic coming into Victoria. VE5EC says he lacks ambition. VE5EZ is the Victoria Club. VE5DV handled a few messages. VE5FG is doing nice work. VE5BR is on 1750 keeping schedules with VE5BL. VE5CH has a Push Pull rig using 2-volt tubes. VE5HP promises a nice traffic total next month.

Traffic: VE5HR 26, VE5DV 10, VE5FG 52, VE5HP 14, VE5AL 5, VE5EW 7, VE5BR 4, VE5AM 3, VE5FI 9.

PRAIRIE DIVISION

MANITOBA — SCM, J. L. Green, VE4BQ — VE4IS leads the Section. VE4DK is now on with a crystal signal. VE4DI is working on a dynatron. VE4CI, VE4AG and VE4FT are on regularly. VE4BQ is re-vamping his "Old Faithful" receiver to AC.

Traffic: VE4IS 26, VE4DK 1.

SASKATCHEWAN — SCM, W. J. Pickering, VE4FC — Our new RM, VE4BB, is on the job and getting results. Let's help him, fellows. Get on 3.5 mc. and move some traffic. VE4GR sends in a nice report. VE4BF is getting out fine. VE4CQ has put his signals into ZL. A new ham is in Saskatoon, VE4JV. VE4DA is getting out. VE4AT is getting some traffic. VE4AV has been cured of the habit of annoying neighbors by installation of a thump filter. VE4CC is on again. X-VE4AV is now W8AWY at Detroit.

Traffic: VE4BB 49, VE4GR 12, VE4AT 8, VE4CC 4.

R. C. POWELL & CO., INC.

offers

The facilities of a factory equipped to manufacture **RADIO TRANSMITTERS and ASSOCIATED EQUIPMENT**

The services of a laboratory devoted exclusively to the development of radio communication equipment.

The assistance of an engineering staff having a broad experience in the design and operation of vacuum tube devices.

Engineers in charge of

**BROADCASTING STATIONS
LABORATORIES and
RADIO COMMUNICATION SYSTEMS**

will find it worth while to obtain our quotations on special equipment required for the improvement or expansion of their installations.

R. C. POWELL & CO., INC.

350 MADISON AVENUE

NEW YORK CITY

QUALITY QUARTZ CRYSTALS SINCE 1927



Write for details of the new Super-Power Crystals and Duplex Holder with temperature control.

Herbert Hollister • Merriam, Kansas
Merriam, Kansas, is a suburb of Kansas City, Mo.

FIRST QUALITY 866, \$2.85

Also 203As, 211s, 845s and other types. Write for data. Of what value is a tube that will not work and work right in your set? We refund your money and without question, if you are not satisfied. If our prices seem higher, the tubes are better, if others are higher they are not worth it. There are no better tubes than "VTEs."

Guaranteed for 90 days' service

VACUUM TUBE EXCHANGE Ridgefield, New Jersey
Western Representative
M. C. James 252A Loma Avenue Long Beach, California



Super Akra-Ohm Resistors

Bulletin 150-G is a special booklet issued by us which fully describes the many uses for Shallcross Resistors in multi-range meter circuits. It also contains valuable charts and wiring diagrams. If you will send 4c in stamps, we will gladly send you a copy of this valuable booklet.



CONDENSER REPAIR KIT

25 uncased highest quality filter condensers, assorted sizes, all voltages $\frac{1}{4}$ MFD to 2 MFD in 200 to 600 D. C. working volts.

List Value \$25.00

INTRODUCTORY OFFER \$8.95

ONLY ONE ASSORTMENT TO A CUSTOMER

New RCA Tubes. Firsts guaranteed. UX 210 Regular \$7.00, **Special \$4.20**; UX 250 Regular \$6.00, **Special \$3.60**; UX 281 Regular \$5.00, **Special \$3.00**; UX 245 Regular \$1.10, **Special 66c**; UX 280 Regular \$1.00, **Special 60c**; UY 227 Regular \$1.00, **Special 60c**.

SPECIALS — Western Electric 1 MFD filter, cased, 1000 D. C. working volts at **90c** each. Baird Television and Short Wave Set — Regular \$110, **Special (Kit) \$49.50**. Televisor for above, regular \$100 value (Kit), **Special \$49.50**. 2000 WV D.C. Potter Cased Condenser Porcelain Insulators 2 MFD Regular \$15.00, **Special \$11.95**; 4 MFD Regular \$25.00, **Special \$19.85**.

Terms: 20% cash with order, balance C.O.D.

Write Us for Prices

WAGENER RADIO SERVICE
1415 Hertel Ave. Buffalo, N. Y.

In appreciation of the constantly increasing patronage of our friends in all parts of the world we are devoting our advertisement this month entirely to

SUPER SPECIALS

These items are all brand new and carry our well known

MONEY BACK GUARANTEE

At these prices we reserve the right to limit quantities. THESE SENSATIONAL PRICES ARE GOOD FOR THIS MONTH ONLY!

Genuine RCA UX-216-B. Practically same characteristics as UX-281. Will stand overload better. In original cartons and guaranteed new. SPECIAL.....\$1.19
Genuine RCA UX-216. New in original cartons.....\$2.75
Heavy Duty UX-566 tubes. Guaranteed first quality.....\$2.70
RCA licensed tubes. All tested but not guaranteed. UV-227 — 19c. UX-245 — 33c. UX-280 — 33c. UX-201-A — 31c.
KELLOGG Hand Microphones. Sold in Feb. 1931 QST for \$6.50. Very sensitive. Designed for Ham Fone, Public Address, and home recording. WHILE THEY LAST.....\$2.45
ROYAL Microphone Transformers. High quality units in neat metal cases. Single Button — \$1.45. Double — \$2.25.
BRISTOL (Genuine) Mike Transformers. For double button mikes. Can also be used for single.....75c
New Thordarson Class B Transformers. T-5100 Input — \$4.40. T-5101 Output — \$5.80.
MERSHON AND TUNGSO 8 Mfd., 450 Volt Electrolytic condensers. Metal cased. Put a quantity in series for high voltage self-healing condensers.....Four for \$1.75. Each 48c
FARADON fibre cased condensers. 1 Mfd., 1500 Volt DC working or 2 Mfd., 1000 volt. 75c each. Four for \$2.45.
AMPLION Transverse Current Hand Mikes.....\$3.45
MILLIAMMETERS. 0-15, 25, 50, 100, 150, 200, 300, or 400. 60c AC Voltmeters. 0-6, 10, or 15 — \$1.50. DC Voltmeters. 300 — \$1.80. 500 — \$2.40. 750 — \$3.00.
JEWELL DC Voltmeters. Pattern No. 88 with external resistor. 1000 ohms per volt. 0-1000 — \$13.45. 0-2000 — \$18.75

IMMEDIATE SHIPMENTS. Try Us!

GENERAL ELECTRIC 5 Henry, 1000 Mill power chokes in metal case. 5000 Volt insulation. 25 Ohms. 11 lbs.
SPECIAL — \$1.50 each. Four for \$4.95.
RCA-VICTOR 30 Henry, 125 MA Chokes. Metal cased.....85c
Double 30 Henry, 125 MA chokes.....\$1.15
ACME Chokes. Brand new. Open frame mounting. Very neat. 30 Henry, 200 MA or 20 H. 300 MA.....\$2.95
RCA 2 Henry, 300 MA Key Click Chokes.....95c
Prompt Delivery on All Thordarson Apparatus at Lowest Prices

Copper Tubing. Pure, heavy, 1/4" stock. Soft. Ft. — 5 1/2c.
Heavy Copper Strap. FB for inductances. 1/8" thick. Per foot: 5/16" wide — 5c, 3/8" — 8c, 5/8" — 12c.
Enameled Antenna Wire. Pure copper. Full rolls. No. 12 — 100 ft. — 42c. 200' — 85c. No. 14 — 29c. 60c.
Aluminum Monitor Shields. 9 x 5 x 6. Knock-down.....\$1.55
Rheostats. 10 ohm. One hole mount. Bakelite.....9c
CARTER Rheostats. 50 Watt. 1, 2, 3, 6, 10, 20, 30, 40, 50, or 100 ohms. List — \$1.75. Buy now.....44c

BLEEDER RESISTANCES

Fully Mounted. Center-tapped. Will not burn out.
100 Watt (1 1/2" x 9 1/2") 5M (5000 Ohms) — 94c, 10M — 99c, 20M — \$1.05, 50M — \$1.12, 100M — \$1.35, 75 Watt (1 1/2" x 8") 80c, 85c, 90c, 95c, \$1.25 (Others call this size 100 Watt).
ROYAL Porcelain Stand-off Insulators. Extra Special.....7c
50,000 Ohm, 50 Watt Wire-wound Grid leaks.....33c
RCA 5,000 Ohm, 50 Watt Leaks.....33c
Sensitive Head phones. 2000 ohm. Complete.....95c
GREBE Transmitting RF Chokes. 300 MA. 1" x 4".....11c
H&H 500 watt single pole, triple throw snap switches.....15c
Odd lot RCA metal cased, used. 800 volt condenser blocks. Each case contains from 5 to 10 Mfd. No selection allowed. 45c each. Four for \$1.45.
Odd lot .00025, .00035, and .0005 var. condensers.....35c
FRESHMAN 125 watt power transformers. Delivers 7 1/2 ct. and 375 volts. Use with 280 in half-wave rectifier to power a 210 oscillator or amplifier. Compound filled metal case. Worth more for filament windings alone.....95c
QUARTZ CRYSTALS. Blank — \$1.74. Oscillating Blanks — \$2.70. 3500 KC Crystals. 1/10 of 1% Accuracy. Good, strong. Oscillators. Best quality.....\$4.70
ROYAL Plug-in Crystal Holders. Very neat.....1.95
TUNGSO Metal cased filter condensers. 6 Mfd. tapped at 2, 2, and 2 Mfd. 800 Volt DC Working. ONLY.....\$1.95
1 Mfd., 1500 Volt and 2 M., 800 in one case.....1.35
Shoot in a Trial Order and be convinced of the High Quality of our merchandise and our quick service

Your money cheerfully returned if you are not satisfied. Deposit required with all orders. No orders accepted under \$2.50

COMPLETE LINE OF ROYAL TRANSMITTERS AND RECEIVERS

FREE Send NOW for our new BARGAIN BULLETIN

The Buy of a Lifetime! Super-Special Prices on PARAGON FILTER CONDENSERS

Neat metal cases with porcelain stand-off insulators. Conservatively rated. They stand up!

Capacity	1000 Volt (Working)	1500 Volt	2000 Volt
1 Mfd.		\$1.55	\$2.25
2 "	\$1.65	2.55	4.20
4 "	2.35	4.25	6.75

CARDWELL CONDENSERS. Types 147-B, T-183, T-190, and 503.....\$5.80
All other types at 40% and 3% off list prices.

QUICK SERVICE LOWEST PRICES HARRISON RADIO CO.

189 Franklin Street Dept. T New York City

The Roanoke Division Convention

(Continued from page 33)

and Chairman of the Convention Committee. In his quiet and efficient way the program was carried through to a successful conclusion, and after the distribution of prizes and viewing the legerdemain of Dr. Fowler, also the motion pictures of Bulaland by Whitaker, W4OC, of Durham, it was voted the best program ever given by any convention committee, and to which we all agree. Will Charlotte undertake the convention next year?

— A. A. H.

I. A. R. U. News

(Continued from page 68)

appeared in these columns of QST since the list was last published in full in the February, 1931 issue, together with certain as yet unrecorded revisions, we present the following addresses to which cards intended for unidentified stations within the countries given, may be sent. We wish to point out, however, that when a station is listed in the callbook, or his QRA has been secured during the contact, the card should be sent direct in order to reduce the growing load being borne by these bureaus. Exceptions to this rule are the countries marked with asterisks. All cards intended for stations in these countries should be sent to the bureaus listed; cards should not be sent direct unless specifically requested during QSO or on the station's card.

Argentina: "Radio Revista," Lavelle 1268, Buenos Aires.
Asia: See Malay States.
Australia: W.L.A. QSL Bureau, Kelvin Hall, Collins Place, Melbourne, Victoria.
Austria: D.A.S.D., Blumenthalstrasse 19, Berlin W57, Germany.
Bahama Islands: See Bermuda.
*Belgium: Réseau Belge, 11 Rue du Congrès, Brussels.
Bermuda: Ian C. Morgan. "Southlands," Warwick East, Bermuda Islands, B.W.I.
Brazil: Vasco Abreu, 89 Rue Riachuelo c/IV, Box 179, Rio de Janeiro; or, L.A.B.R.E., Rua Annita Garibaldi, 7-6°, Caixa Postal 286, Sao Paulo.
Canada: A.R.R.L., West Hartford, Conn., U.S.A.
Chile: Luis M. Desmaris, Casilla 50D, Santiago de Chile.
*China: I.A.R.A.C., Box 685, Shanghai.
Cuba: Pedro Madiado, calle Santa Rosa, Buen Retiro, Marianao, Habana.
Czechoslovakia: Send cards either to S.K.E.C., Smichov "Sumava," 1429, Prague; or, K.V.A.C., Hlavni Posta, Box 531, Prague.
Denmark: Experiment erende Danske Radioamatører, Box 79, Copenhagen.
Dutch East Indies: N.I.V.I.R.A., Egb. A. Krygsman, Sec'y, c/o Bataafische Petrol Co. Boela, Ceram, D.F.I.
England: R.S.G.B., 53 Victoria St., London, S.W. 1.
*Estonia: V. Suigusaar, Hobe t. 4, Pernau.
Finland: S.R.A.L., Pohjola, Helsinki.
France: R.E.F., 19 rue Claude Vellefaux, Paris 10^{ème}.
Germany: D.A.S.D., Blumenthalstrasse 19, Berlin W. 57.
Guam: C. R. Spicer, Naval Communications Office, Agaña.
Hong Kong: H.A.R.T.S., Box 651, Hong Kong.
Hungary: M.R.A.E., I. Zirkén Janka, Utea 14/B, Budapest.
India: R. N. Fox, 6 Pachpedi, Jubbulpore.
Iraq: Kenneth S. J. Rancombe, R.A.F. W/T Section, c/o No. 1 Batt., Iraq Assyrian Levies, Diana, near Rowanduz, Kurdistan.
Irish Free State: W.S.I., 12 Trinity St., Dublin. (Cards for Northern Ireland go to the R.S.G.B., England.)
Italy: A.R.I., Viale Bianca Maria 24, Milan.

BETTER REGULATION

is one of the desirable characteristics of modern carefully engineered rectified alternating current

POWER SUPPLY CIRCUITS

described in Bulletin No. 200

SEND FOR A COPY

DELTA MANUFACTURING CO.

(ACME APPARATUS)

ELECTRICAL ENGINEERS AND MANUFACTURERS

37 OSBORNE STREET

CAMBRIDGE, MASS.

Massachusetts Radio and Telegraph School

18 Boylston Street, Boston

Send for Catalogue

Tel. Hancock 8184

Established 1905

J. T. Rooney, B.Sc.

Pioneer Piezoelectric Crystal Maker

Crystals finished to any practicable specifications

160-80 meter band Crystals. \$4.50

50 Woodett Place

Buffalo, N. Y.

ALUMINUM BOX SHIELDS



Genuine "ALCOA" stock, silverdip finish. 5 x 9 x 6 \$1.80 — 9 x 14 x 7 \$4.65. 10 x 6 x 7 Monitor size \$2.95. 5 x 5 x 5 Shield (like picture on the left) \$1.00

ANY SIZE TO ORDER

Coll Shields, Coll Hole Covers, Shielded Wire Resistance wire for shunts and ovens.

Hedgehog Transformers

Keying Relay for A.C. or D.C.

double pole. \$1.95

19 R.P.M. Motor, A.C. or D.C.

for remote control, etc. \$3.50

Selenium Cells. \$4.00

Skinderviken Button. 65c

C. R. L. IMPEDANCE COUPLED

1 STAGE AUDIO AMPLIFIER for Short Wave

and Television. \$2.95

LARGEST VARIETY OF

RADIO PARTS IN THE WORLD

BLAN, The Radio Man, Inc.

89 Cortlandt St. Box Q2

New York City

"BUDDY" Test Prods

Always sharp pointed, using pho-

nograph needles, 4-ft. wires, spade

or phone tips. Colored nipples

identify each lead. \$1.50 pair.

Identify each lead. \$1.50 pair.

Identify each lead. \$1.50 pair.

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Identify each lead. \$1.50 pair.

ANOTHER ACHIEVEMENT BY

ARCTURUS

New Improvement in automobile tubes permits use with A.C. or D.C.

Engineers and automotive set manufacturers have long felt the need for improved, more dependable automobile radio tubes.

Now—Arcturus meets that need with the Types 136A, 137A and 138A—utilizing a new non-inductive "M" filament. This is the first time an "M" filament has been used in indirectly heated cathode receiving tubes as a heater—another Arcturus

achievement. These tubes are interchangeable with corresponding types.

In uniformity, serviceable life and performance these new Arcturus automobile tubes establish advanced operating standards. Besides permitting their use with a.c., the non-inductive filament eliminates fluctuations in current draw and banishes noisy reception. The rugged design and compact size of these tubes, make the 136A, 137A and 138A especially fit the specifications for a universal receiver to operate on either a.c. or d.c.

Complete specifications and characteristics sent on request. Arcturus Radio Tube Co., Newark, N. J.

ARCTURUS

"The Blue TUBE with the LIFE-LIKE TONE"

Say You Saw It in QST — It Identifies You and Helps QST

83



A.R.R.L. FORMS FOR THE AMATEUR

THE AMERICAN RADIO RELAY LEAGUE

MEMBERS CORRESPONDENCE

MEMBER'S CORRESPONDENCE STATIONERY

One color (black) heading now being used at greatly reduced cost to members.

Write your radio letters on League stationery — it identifies you.

Lithographed on 8½ x 11 heavy bond paper.

100 sheets	.....	50c
250 sheets	.....	\$1.00
500 sheets	.....	\$1.75

Postage Included

THE AMERICAN RADIO RELAY LEAGUE HEADQUARTERS WEST HARTFORD, CONN. U. S. A.		RADIOGRAM	
TO: EARL BURLINGAME 14 NORTH STREET N. W. WASHINGTON, D. C.	FROM: [Blank]	DATE: 3/7/71	TIME: 5/
KINDLY ADVISE PRESENT STATUS OF THE ORIENTAL TRAFFIC ROUTE HOPPING FROM THE EAST COAST TO THE ORIENT STOP IN ROSEL STILL A MEMBER OF THIS LEAGUE VERY LATEST ROUTE HOPPING BULLETIN DATED TODAY TO E. L. HATTE			
Rec'd	Transmitted	Location	Time
3/7/71	5:15 PM	INDIANAPOLIS, INDIANA, U.S.A.	5:15 P.M.

OFFICIAL A.R.R.L. MESSAGE BLANKS

Most convenient form. Designed by the Communications Department of the A.R.R.L. Well printed on good bond paper. Size 8½ x 7½. Put up in pads of 100 sheets. One pad postpaid for 35c or three pads for \$1.00.

MESSAGE DELIVERY CARD FOR RADIOGRAM via AMERICAN RADIO RELAY LEAGUE	
From:	Date:
Any received address	At Radio Station
Phone	
THIS MESSAGE WAS TRANSMITTED FREE OF CHARGE BY THE A.R.R.L. RADIO STATION OF THE AMERICAN RADIO RELAY LEAGUE. ANY OTHER MESSAGE WILL BE SENT FREE BY PHONE AT THIS STATION.	

MESSAGE DELIVERY CARDS

Neatest, simplest way to deliver a message to a near-by town. On U. S. stamped postals 2c each. On plain cards (for Canada, etc.) 1c each, postpaid.

AMERICAN RADIO RELAY LEAGUE
WEST HARTFORD, CONN., U. S. A.

Japan: Kyoza Asamura, 3 Minami Tanabe Cho, Osaka.
Java: Th. A. F. Leyzers (via), Van Heutz Boulevard 2, Batavia, Centuz.
Jugoslavia: D.A.S.D., Blumenthalstrasse 19, Berlin W. 57, Germany.
Kenya Colony: George F. K. Ball, Kololo Hill Radio, Kampala, Uganda, East Africa.
Latvia: A. Karklin, 2, Lencu, dz. 8, Riga.
Luxembourg: J. Wolff, 67 Avenue du Bois, Luxembourg.
Malay States: George D. Forbes, Kelpin Estate, Bahau N. S.
Mexico: Carlos G. de Cosio, Ave. Hidalgo P. 20, Queretaro.
Netherlands: N.V.I.R., Post Box 400, Rotterdam.
New Zealand: N.Z.A.R.T., Box 489, Wellington.
Norway: N.R.R.L., Post Box 2253, Oslo.
Peru: Radio Club Peruano, Apartado 538, Lima.
Philippine Islands: A.R.R.L., West Hartford, Conn., U.S.A.
Poland: L.K.K., Bielowski 6, Lwow.
Porto Rico: Francis McCown, Family Court No. 7, San-turce.
Portugal: (Including all CT calls.) R.E.P., 93 Rua Senhora da Gloria, Lisbon.
*Roumania: Lt. C. Bratescu, Str. Ciru Ilescu 6, Bucarest 6.
South Africa: S.A.R.R.L., P. O. Box 7028, Johannesburg.
Spain: Asociacion EAR, Mejia Lequerica 4, Madrid.
Sweden, S.S.A., Dr. Bruno Rolf, Skaldevager 14, Alaten Stockholm.
Switzerland: U.S.K.A., Postfach, Berne 14.
Uruguay: Resident, Casilla de Correo 37, Montevideo.
U.S.S.R.: S.K.W., Polytechnic Museum 124, Moscow.

Cards for countries not listed in the foregoing can be sent to the A.R.R.L. Of course, colonies and dependencies of the larger countries listed can be handled through the "mother" bureaus when there is no local service. Further corrections and additions to this list will be welcomed.

Silent Keys

It is with deep regret that we record the passing of these amateurs:

Earl B. S. Burlingame, W1OU, Auburn, R. I.
Mrs. Blanche Driver, WSADU, Delaware, Ohio
Gordon W. Jewett, ex-WSON, Watertown, N. Y.
Lt. R. V. Lucas, ex-9UH, Billings, Mont.
Wilfred Prongue, W7AWF, Vancouver, Wash.
Roy E. Watterson, WSPZ, Cleveland, Ohio

Calls Heard

(Continued from page 61)

Bruce L. Kelley, 120 Lenox St., Rochester, N. Y.
7000-ke. band

em2na em2rx em2av em2xa en8eis g2bg gm2fe j5br k4ry
k5aa k6bme ka1al ve2cu ve4by ve4ti ve5aw ve5bh vk2sa
vk3or vk5jr w1abl w1mk w2arv w3axv w3bpb w3wf w4aoi
w4dtw w4fp w4gw w4qr w4tx w5ada w5alz w5amt w5aqy
w5cae w5enh w5caz w5dv w5ke w5lp w5nq w6adk w6awa
w6eqy w6ewe w6exa w6od w7aab w7fv w7jq w8acy w8aja
w8anq w8bjh w8cfs w8ecy w8evi w8eye w8fde w8flf w8fot
w8rj w8sf w8tm w8wk w9agg w9bgi w9bqm w9erh w9dct
w9dil w9dti w9eej w9fhh w9gpy w9ghi w9go w9hvt w9dx
x3b al3bb al3ct al4ap

HAMS! Don't Pass These Bargains Up . . . Our Prices Should Be Compared as They Are the Lowest in the U. S. A.



RCA LICENSED TUBES

All brand new — tested for gas — mu — etc.
 6X4-227, 6 for \$1.00 UX-245, 45c UX-171A, 35c
 UX-226 UX-224 UX-228, 35c UX-201A, 35c
 UX-230 UX-231-232-235, 65c
 UX-247, 69c UX-210, 95c UX-250, 95c
 UX-281, 95c UX-199, 39c UX-199, 65c

TUBES — IN ORIGINAL BOXES

Brand New

RCA UX210, \$3.95
 RCA UX250, \$2.25
 RCA UX240, \$2.75

All other types — 40% off list.

W.E. 211-D, Slightly used, \$8.00
 W.E. 211-E, New, \$10.00
 U. S. Navy — 102-D made by W.E. 1½ volt high mu-tubes for use in W.E. 8A-8B-8C amplifier. Reg. price \$14.00. \$1.95
 CUNNINGHAM & ARCTURUS TUBES—40%

KECO STORAGE BATTERY CHARGERS, 2½ AMP.

for 6-8-12-24-volt batteries
 Brand New — less Tungar type tubes, \$1.95
 2½ amp. tube, \$1.95

WESTON METERS TYPE 301

All sizes volt ammeters, etc., 40%
 SLIGHTLY USED W.E. DOUBLE BUTTON
 387-W — Mikes, Regular \$100.00. Yours, \$20.00
 RCA HAND MIKES, \$2.95

FILTER CONDENSERS

Condenser Corp. of America, 9 MFD filter condenser. Blocks tapped 4-3-2-MFD — 1,000 volt. Brand new introductory price, \$1.65
 50 Henry Filter Chokes — a real job, will pass 125 mills, 95c
 Newark 50 Henry Filter Choke similar to Amertran 854, \$1.95

AERIAL WIRE — ONE OR 1000 FT.

No. 14 Enamel, 45c per 100 ft.
 No. 12 Enamel, 69c per 100 ft.
 No. 10 Enamel, 85c per 100 ft.
 Genuine Silicon Phosphor Bronze SHIP aerial
 No. 7 x 18, \$1.95 per 100 ft., coil only
 No. 7 x 19, \$1.75 per 100 ft., coil only

No. 7 x 20, \$1.50 per 100 ft., coil only
 No. 7 x 22, \$.95 per 100 ft., coil only
 Rubber covered lead-in wire per 50 ft. coil, 29c

POWER TRANSFORMERS

Franklin Power Transformer, shielded, bottom lug connections.
 350-350 V. — at 100 M.A.
 5 V. — at 2 A.
 2½ V. — at 3 A C T
 2½ V. — at 12 A C T

\$3.95

TRANSMITTING TRANSFORMERS

1500-0-1500 } at 200 M.A., \$12.50
 2000-0-2000 }

ALL CASED

FILAMENT TRANSFORMERS FOR BCL SETS

Mounted, shielded — BP terminals with 5-ft. rubber cord and plug. One-2½V. — One-5V — one 1½V — All with C.T. Reg. \$9.00. \$95c

MISCELLANEOUS BARGAINS

ELKON BH Raytheon tube — 125 mil. Replacement unit will last 5,000 hours. Reg. \$6.00. With 4 prong UX Adapter, 75c
 Tung-Sol 8 MFD Mershon type filter condenser, 49c
 Sampson Pan 19 Amplifiers, Slightly used, \$25.00
 Weston Milliameters — volt meters Type 301, \$4.50
 Victor ABC Transformers, \$2.35
 6½" porcelain stand-off insulators with ¼ in. hole — screw flange base glazed — 35c.
 Fada AC Dynamic speakers, 10", Reg. \$72.50. In sealed cabinets, factory carton, \$11.95
 Utah phonograph units — ideal movement to replace your defective Baldwin phones — or can be used in any speaker, 39c
 Phono-o-Link phonograph pick up, \$2.45
 RCA double 30 Henry 125 mil chokes, \$1.15
 No-Bee 180 volt B Eliminator, uses 280 tubes, 3 taps with tube, \$4.95
 Brandes Earphones with plug, \$1.95
 Pal Earphones — 2,000 ohm, 95c
 Electric soldering irons, 85c
 25,000-50,000-75,000 CRL vol. controls, 40c
 Dynamic speaker push-pull output transformer, 49c

Include Postage with all orders and 20% deposit against C.O.D. shipments. Will ship express unless otherwise ordered. No stamps. No order for less than \$1.00 accepted.

The New Jersey Radio Supply Co. RADIO BLDG. Plane and Market Sts. NEWARK, N. J.

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 Transmitting and Receiving Parts
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 of the West

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TELEVISION Photoelectric Cells

CAESIUM ARGON TYPE

HIGH SENSITIVITY AND CLARITY

Manufactured in All Sizes

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TELEPHOTO & TELEVISION CORP.

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For **REAL SATISFACTION** use the best

It's cheapest in the long run

Siemens & Halske Condensers are the world's standard for quality

YOUR NET PRICE IN U. S. A.

Working voltage Test voltage DC	1000 3000	1500 4000	2000 6000	3000 10000
1 MFD	\$2.25	\$2.70	\$5.25	\$12.00
2 MFD	3.90	5.10	8.10	19.50
4 MFD	6.60	8.70	15.60	36.00

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Write for this book
FREE!
You cannot possibly afford to be without this valuable book it is not just another CATALOG—it is indeed
A VERITABLE ENCYCLOPEDIA of the RADIO INDUSTRY
WHOLESALE PRICES TO ALL

Super-Heterodyne Short-Wave Coils and Automatic Wave-Length Switch.
No coils to plug in! Build your own Super-Heterodyne Short-Wave Converter. Range covered by 4 position NO-LOSS bakelite shaft switch: 10 to 20, 20-40, 40-80, and 80 to 200 meters. Remarkably compact. Your cost (order from this advertisement) \$7.12
2 Gang Miniature Hammarlund .000145 Mfd. Variable Condenser. \$2.95

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10 to 200 Meters

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123 Q West 17th St. New York N.Y.

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EXCHANGED!

In exchange for your old handbook and the small sum of Bucks 1 we will send you a copy of the new supervaluable 9th edition of

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and let you keep the old copy yourself — so you can see how vastly better the new one is. Seize this remarkable opportunity to-day!

A.R.R.L.

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West Hartford, Conn.

Rush Ninth Edition Handbook!

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(Name)

.....
(Street or Box)

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(City and State)

W6BUO, J. H. Humbrock, 9808 Hannum Dr.,
Palms, Calif.

7000-ke. band

ac1tk ac3gb ac8es ac8at ac8ak ac8ja ac8al ac8mn ac8hm
ac8aq ac8aw ac8ag ac8we ac8es aulcs aulps aulpk aulkb
ce3ag cm2av cm2wa cm2wd cm8yb f3ock hclfg hclfg hclfg
j1eb j1es j1eo j1em j1dm j1ek j1dh j1et j1et j1dr j1eq j1do
j1dn j1ew j1eb j1ec j1ee j1dp j1er j1di j1dm j1dd j1fb j1gb
j1de j1dk j1dt j1du j1dh j1cl j1df j1ce j1ee j1ee j1ef
k4es k4rj k4cf k5aa k6egd k6avl k6cab k6cmc k6dyc
k6bjj k6dv k6dva k6ir k6aja k7ox k7akv k7aml k7pq k7iw
k7atf k7awm k7atd k7aln k7bdw k7wm kalce kalhr kalco
kaljr kalnf kalpw kalap kalce kaljm kalcm kalpr kalrt
kalrg kalhw ka9pb nlnlc nylaa om1fo om1tb om2es
om2ej om2re om2tg pk1jr pk2wj pk3bm pk3bq pk4ja
ti2hv vclco ve2eu ve3jw ve3bm ve3ud ve3gh ve4bq ve4dj
ve4ec ve4hy ve4zk ve4cv ve4ab ve4ff ve4ba ve4ez ve4dg
vk2lx vk2ap vk2nr vk2wd vk2no vk2hq vk2ac vk2aw
vk2ba vk2px vk2hc vk2ax vk2hb vk2ja vk20e vk2hw
vk2tx vk2sw vk2nr vk2vg vk2jo vk2sa vk2lx vk2sz vk2gr
vk2af vk2br vk3ws vk3es vk3bs vk3rj vk3bw vk3xi vk3ju
vk3rq vk3rw vk3pp vk3hw vk3oe vk3gp vk3cx vk3jy
vk3wy vk3wl vk3as vk3nm vk3bb vk3gj vk3pr vk3hk
vk3ek vk3le vk3rg vk3jt vk3ka vk3ls vk3sw vk3rs vk3ml
vk3pa vk3wx vk3jk vk3zb vk3ju vk4fb vk4ah vk4vj vk4ba
vk4el vk4wo vk4hr vk5by vk5sk vk5gr vk5wr vk5hg
vk5dq vk5ml vk5le vk5mf vk5mb vk5jo vk5my vk5it
vk5bo vk5jo vk5gw vk5gk vk5lx vk5wj vk6wi vk6mu
vk6gf vk6mo vk6js vk6ow vk6bn vk7jk vk7ch vk7ge
vplln vplws vplaj vplff v6ag v6ah v6ban x1r x1d x1aa
x1as x9a xeu2bv yalfm al1bn al1ek al1ak al1ar al1gq al2dj
al2bg al2fr al2eu al2gn al2cl al2gj al2bi al2ab al2di al3ce
al3aw al3aq al3bn al3as al3cl al3et al3cs al3as al4ap as5u
vxx4x

W8JB, Edmund J. Papierski, 77 E. Doughty St.,
Dunkirk, N. Y.

(November and December, 1931)

7000-ke. band

cm2as cm2jm cm2mm cm2op cm2rs cm2av cm5fc cm8by
hc1fg k4ay k4bu k4rk k4ry k5aa ve4cv ve4dk w6ahp
w6ahs w6aix w6alw w6am w6and w6awo w6bau w6bc
w6bgv w6bjf w6bqp w6buo w6bxi w6by w6cae w6cvf
w6cxw w6czq w6ddb w6cab w6efc w6etg w6etj w6ewk
w6fel w6hk w6mv w6sg w6sn w7aat w7hr x1rm

Election Notice

(Continued from page 31)

2 of Article IV defining their eligibility; and By-Laws 10 to 19 providing for their nomination and election. Copy of the Constitution & By-Laws will be mailed any member upon request.

2. The election will take place during the month between March 15 and April 15, 1932, on ballots which will be mailed from Headquarters in the first week of that period. The ballots will list the names of all eligible candidates nominated for the position by A.R.R.L. New England Division members.

3. Nominating petitions are hereby solicited. Ten or more A.R.R.L. members of the New England Division have the right to nominate any member of the League in that division as a candidate for director therefrom. The following nominating form is suggested:

(Place and date)

Executive Committee,
American Radio Relay League,
West Hartford, Conn.

Gentlemen:

We, the undersigned members of the A.R.R.L. residing in the New England Division, hereby nominate of as a candidate for director from this division for the remainder of the 1931-1932 term.

(signatures and addresses)

ODEON LO-RIPPLE MERCURY VAPOR RECTIFIERS

Type	FILAMENT	Amperes		Inv. Peak Volts	PLATE	Price
	Volts				Peak Amps.	
866	2.5	5		7500	.6	\$2.95
866—Super Heavy Duty	2.5	5		7500	.6	4.50
866B	5	5		7500	1.2	6.50
281	7.5	5		7500	.3	4.00
872	5	10		7500	2.5	12.00
875	5	12.5		15000	2.5	25.00
869	5	20		20000	5.0	100.00

Odeon Super Heavy Duty 866 Tubes are the finest tubes of this type obtainable and we guarantee them for six months excepting breakage.

FEBRUARY SPECIALS

2 Heavy Duty 866's with Fil. Transformer	\$12.50
Odeon 866 Filament Transformer	4.50
New Loftin-White pentode amplifier	10.95
New Loftin-White 245 amplifier	9.95
RCA Wave traps (Model UR-1146)	.65
Swan-Haverstick Antenna Sockets	.45
Excel Noise Filters	2.85
Amervox A.C. Dynamic Chassis with ElKon Rectifier	6.50

20% With Order—Balance Shipped C. O. D.

Send Postage or Express Charges

Mail Orders to:

30 CLINTON STREET **ODEON MANUFACTURING CO.** NEWARK, N. J., U. S. A.

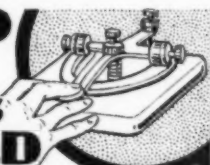
Rectifier Charger Bulbs

.06 Amps.	\$2.15
2. Amps.	2.15
5-6 Amps.	3.95
15 Amps.	7.00

Write for
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Discount



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There's ROMANCE IN TELEGRAPHY

The man who knows the code is in touch with the world. Become an expert operator, make big money. LEARN IN YOUR OWN HOME — easily, quickly with TELEPLEX — the Master Teacher.

Entirely new code course in 12 rolls of tape. During last ten years, TELEPLEX has trained more operators than all other methods combined.

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Don't buy any radio parts
until you have seen the



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The Oldest "HAM" Supply House

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FOR SECTION COMMUNICATIONS MANAGERS
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S. C. M.
Red Background
Pin type only

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\$1 EACH
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3/8" SIZE

AMERICAN RADIO RELAY LEAGUE

West Hartford, Connecticut

Say You Saw It in QST — It Identifies You and Helps QST

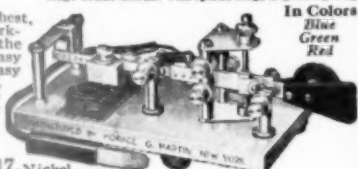
Sending Is EASY

With the
New

Easy-Working
Genuine Martin No. 6
VIBROPLEX

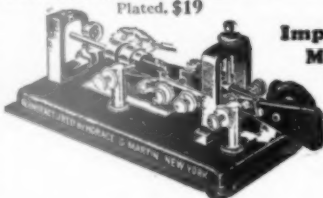
Reg. Trade Marks: Vibroplex Bug; Lightning Bug

The smoothest, easiest-working bug on the market. Easy to learn. Easy to operate. Makes sending easy.



In Colors
Blue
Green
Red

Black or Colored, \$17. Nickel Plated, \$19



Improved
MARTIN
Vibroplex

Black or Colored, \$17. Nickel Plated, \$19

Special Martin Radio Bug — Extra large. Specially Constructed Contact Points for direct use without relay. Black or Colored. \$25

Old Vibroplex accepted as part payment
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THE VIBROPLEX COMPANY, Inc.
825 Broadway, New York City
Cable Address: "VIBROPLEX" New York



"CQ" "CQ" "CQ"

Amateur Fone Hams

Properly engineered transformers for Class "B" Modulation using 210 tubes (see December issue of Q.S.T.)

Type AI-910
Input Transformers
Weight 2½ lbs.

Type AM-911
Modulation Transformers
Weight 6 lbs.

Standard Package containing one each of these transformers, price, net.....\$9.00

Shipping Weight 10 lbs.

Mail Orders Filled Promptly
We can also supply Filament, Plate Transformers and Chokes for small and medium powered "ham" transmitters.

WEBSTER ELECTRIC COMPANY

Established 1909

Racine, Wisconsin, U. S. A.

The signers must be League members in good standing. The nominee must be a League member in good standing and must be without commercial radio connections. His complete name and address should be given. All such petitions must be filed at the headquarters office of the League in West Hartford, Conn., by noon of March 15, 1932. There is no limit on the number of petitions that may be filed, but no member shall append his signature to more than one such petition.

4. This election is the constitutional opportunity for members to put the man of their choice in office as the representative of their division. They are urged to take the initiative and file nominating petitions immediately.

For the Executive Committee:

K. B. WARNER, Secretary.

West Hartford, Conn., January 15, 1932.

Which Tube for the Crystal Oscillator

(Continued from page 26)

Type '10, using the same plate input in both cases.

All in all, the '47 appears to be quite the "berries" as a crystal oscillator. But don't substitute one for your present oscillator and expect to get more output (on the fundamental frequency) with the same plate voltage — it doesn't work that way. It will give about the same output, but with less heating of the crystal. Or at higher plate voltages it will give more output without hurting the crystal. We have run the tubes with 500 volts on the plate for stretches of an hour or more with no apparent damage, so that voltages up to 500 appear to be safe, even though not recommended in the instruction sheets. But at 300 or 350 the output is about all we need ordinarily — and the crystal thinks it's on a holiday.

Strays

The glass toothbrush holders which serve so well as spacers for feeder wires may also be used as stand-off insulators if the strain is not great. Simply drive two or three long-shank tacks through the perforations in one of the end pieces; this will hold the end piece firmly to the wall and the glass can then be threaded into it. After that it is simple to attach the lead-in or feeder wire to the other metal end piece.

— WSRD

The December issue of *Cunningham News* carries this interesting heading, "Aerial Should be Taught, Says Engineer." A little education might help some of them to do more radiating, to be sure! We'll overlook that one, though, because the same issue carries a nice little story on the growth of amateur radio.

Wall insulators of the G. R. type make good and easily-mounted forms for r.f. chokes for the transmitter. The grooves should be wound full of No. 28 or 30 d.c.c. wire in the same way as the usual slotted forms of composition or wood.

— WEASY

QST Oscillating Crystals

"Superior by Comparison"

New Price List Effective Immediately

New prices for grinding power crystals in the various frequency bands, said crystals ground to an accuracy of plus or minus .03% mounted:—

(Frequency range)	New list
100 to 1500 Kc.	\$40.00
1501 to 3000 Kc.	\$45.00
3001 to 4000 Kc.	\$50.00
4001 to 6000 Kc.	\$60.00

Above prices include holder of our Standard design. If crystal is wanted unmounted deduct \$5.00 from the above prices. Deliveries can be made within two days after receipt of order. In ordering please specify type tube, plate voltage and operating temperature. *Special prices will be quoted in quantities of ten or more.*

POWER CRYSTALS FOR AMATEUR USE

The prices below are for grinding a crystal to a frequency selected by us unmounted (if wanted mounted add \$5.00 to the price list) with a calibration accurate to BETTER than a tenth of one per cent. Immediate shipments can be made and all crystals guaranteed.

1715 to 2000 Kc. band	\$12.00 each
3500 to 4000 Kc. band	\$15.00 each

LOW FREQUENCY STANDARD CRYSTALS

We have stock available for crystals as low as 13 Kc. Prices upon receipt of specifications.

SCIENTIFIC RADIO SERVICE

124 Jackson Ave., University Park
HYATTSVILLE, MD.

"Crystal specialists since 1925"

JACOBS SEPARATOR

Patents Pending



For the efficient and rapid construction of 2 wire R.F. feed lines used in conjunction with current and voltage fed Hertz antenna systems.

Price \$8.00 per dozen, F.O.B. New York, N. Y.

CHARLES F. JACOBS (W-2EM)
270 Lafayette Street New York, N. Y.

Do you know that the latest *Radio Amateur's Handbook* is available in bound form—\$2.00 per copy, postpaid?

When ordering a copy of this 9th edition, look at your present copy and determine if you want your next copy in more permanent form.

PACIFIC COAST

AMATEURS

WRITE FOR OUR 1932 CATALOG

ASSURE YOURSELF
OF PROMPT AND EFFICIENT MAIL ORDER SERVICE ON ALL LEADING MAKES OF SHORT WAVE TRANSMITTING AND RECEIVING APPARATUS...

RADIO MANUFACTURERS SUPPLY CO.

1000 So. Broadway
LOS ANGELES



BE SURE TO

ADDRESS YOUR ORDERS 1000 S. BROADWAY

UNIVERSAL MODEL "X"

Startlingly
NEW

2-BUTTON MICROPHONE \$10.00



Advanced 1932 superiority at today's rock-bottom prices. Same high standards, same exclusive features. Pure gold contacts. Duralumin diaphragm. Is exceptionally rugged. Model X sets a new high standard for quality, at a price that defies competition... For sale by dealers everywhere... New Catalogue with diagrams now ready.

Universal
Microphone Co., Ltd.
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.. Includes Radio-phone, Television and
Wireless Telegraphy

PORT ARTHUR COLLEGE

PORT ARTHUR (world-known port) TEXAS

Say You Saw It in QST — It Identifies You and Helps QST



U. S.
GOVERNMENT
ACCREDITED
TRAINING
SCHOOL

In three to seven months, we train you to pass government examination and secure your license. Examinations are held in our school about every 90 days. Our graduates are operating broadcasting stations in all parts of America, and many are travelling the seven seas as ship operators. If further details desired, mail coupon.

Port Arthur College, Port Arthur, Texas

Please send details concerning Radio Course to

Name.....

Street or Box.....

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« EQUIPMENT FOR THE DIS-CRIMINATING TECHNICIAN »

THE EXACTING RADIO AMATEUR DESIRES THE PROPER EQUIPMENT TO COMPLETE A PARTICULAR JOB. WE CAN SUPPLY YOUR NEEDS

CRYSTALS—Genuine powertype. Cut from best virgin Brazilian quartz. Corners rounded. Sides perfectly beveled. Ground with FFF carborundum. X cut only and 1" square. Guaranteed for 500 volts. Specify anywhere in the 80-meter band. An IEL job par excellence. .1 of 1% calibration. Each . . . \$5.25
Oscillating blanks, each . . . \$2.50
80-meter crystals reground to higher frequencies in 80-meter band, X or Y cut . . . \$2.00

HOLDERS—Plug-in dust proof holders. The feature of this holder is the non-erosive nickel-plated contact to crystal surfaces. This assures you of clean surfaces at all times. You will like it. . . . \$2.25
Crystal and holder, Special . . . \$7.25

CRYSTAL OSCILLATORS—Completely shielded in 6 x 5 x 9 can. Best of parts used. Fully constructed and thoroughly tested. For any four-prong tube. Supplied with 80-meter coil and one of our crystal holders. Fully guaranteed. Complete with holder. . . . \$19.50

KEY CLICK FILTERS—This is an IEL development. Best of parts used. Encased in metal. For all tubes up to 2000 volts at 2 amps. plate rating. This is a complete unit. . . . \$5.50

SPEED BUG—Allows you to send from 8 w.p.m. up; smoother and clear cut transmission. This key has established a fine reputation for itself. Officially adopted by the U. S. Signal Corps. . . . \$9.85

V. F. HERTZ ANTENNAS—Single wire feed. No. 12 solid enameled wire (Cut to Length), clearly marked for insulators and feeder. Why fuss with all measurements? Accuracy 1/4 of 1%. Works on harmonics without change. State frequency. 20 m.b., \$1.25; 40 m.b., \$1.50; 80 m.b., \$3.00.

BRAND NEW! Unconditionally guaranteed. 203 A's . . . \$16.00
Brand New! Unconditionally guaranteed 211's, 75 Watts . . . \$16.00

SPECIAL—RCA 845's slightly used. Guaranteed in perfect condition. Limited quantity. . . . \$15.00
Fleischman carried in stock. Write for quotations.

Built to Order: Transmitters, transmitter power packs, public address systems, resistance, transformers, etc. Your inquiries and problems invited.

TERMS—Check, cash, M.O. or C.O.D. 20% against C.O.D. orders.

IRBEN EXPERIMENTAL LABS.

1404 Noble Avenue

New York City

Now—prices greatly reduced on Centralab Volume Controls

Effective January 1st, 1932, new low prices go into effect on the famous CENTRALAB REPLACEMENT VOLUME CONTROLS. These reductions represent very important savings. See your nearest distributor or dealer.

We have prepared a booklet describing the method of making CENTRALAB FIXED RESISTORS. It is called a "BAPTISM OF FIRE." It is FREE for the asking.

Centralab

MAIL COUPON TO-DAY

CENTRAL RADIO LAB.
929E Keefe Avenue, Milwaukee, Wisconsin

Please send me your free booklet describing your FIXED RESISTORS

Name.....

Address.....

City..... State.....

QST

To cut bakelite or similar tubing with square ends take a piece of paper with a straight edge and wrap two or three times around the tubing to be cut. Square up the edges of the paper and use it as a guide for drawing a line for the saw to follow.

—WIBPJ

An interesting booklet, known as Bulletin No. 150, published by the Shallcross Manufacturing Co., Collingdale, Pa., contains a good deal of information on multi-range meter circuits of interest to the amateur. The experimenter will find the description of a combination multi-range a.c. and d.c. volt-meter and milliammeter of particular value. The price is ten cents.

Sponge-rubber balls sliced in half make good shock absorbers for the power supply, transmitter, receiver or anything else. They can usually be obtained for five cents.

—W9CER

In putting a sanded finish on aluminum much work will be saved if both steel wool and emery (the grade known as "flour") are used together. The wool is dampened and dipped in the emery.

—W5AGA

The 'Phone Bands Are Modified

(Continued from page 22)

recourse is 1875-2000). And, starting April 1st, all telephony between 1715 and 1875 kc. must cease and move up to the 1875-2000 portion. For these 'phones the best frequencies, provided they also have the right to operate between 3900 and 4000 kc., lie between 1950 and 2000 kc., for then the harmonic relation obtains and two-band operation is available from one crystal. Let's see, fellows, if we can't do an orderly job of changing over.

An Unorthodox Receiver

(Continued from page 13)

fiddling with each pair of coils to produce a "match" sufficiently accurate to make unnecessary any adjustment of the trimmer other than a preliminary setting for each band.

The complete receiver shows a performance which fulfills our fondest hopes. It has sensitivity to burn and operates to best advantage with a ten-foot antenna; it has all the selectivity for 'phone work which could be expected; it is unusually comfortable to operate; it is, to all indications, reliable.

Strays

Dietzgen's "Perfect" cross-section paper is FB for that dynatron calibration curve. It has ten squares to the inch and comes in roll form, 20 inches wide, and as long as you wish. It can be obtained from almost any store handling draftsmen's supplies.

—W9DVE

HAM-ADS

(1) Advertising shall pertain to radio and shall be of nature of interest to radio amateurs or experimenters in their pursuit of the art.

(2) No display of any character will be accepted, nor can any special typographical arrangement, such as all or part capital letters be used which would tend to make one advertisement stand out from the others.

(3) The Ham-Ad rate is 15¢ per word, except as noted in paragraph (6) below.

(4) Remittance in full must accompany copy. No cash or contract discount or agency commission will be allowed.

(5) Closing date for Ham-Ads is the 25th of the second month preceding publication date.

(6) A special rate of 7¢ per word will apply to advertising which, in our judgment, is obviously non-commercial in nature and is placed and signed by a member of the American Radio Relay League. Thus, advertising of bona fide surplus equipment owned, used and for sale by an individual or apparatus offered for exchange or advertising inquiring for special equipment, if by a member of the American Radio Relay League takes the 7¢ rate. An attempt to deal in apparatus in quantity for profit, even if by an individual, is commercial and takes the 15¢ rate. Provisions of paragraphs (1), (2), (4) and (5) apply to all advertising in this column regardless of which rate may apply.

PLATE power for your set, the very heart of its performance. For quietness, DX ability, lifelong permanence, absolute dependability, lowest ultimate cost, no other plate source even approaches the achievement of an Edison steel alkaline storage B battery. Built painstakingly; every joint pure nickel, upset electrically welded. Genuine Edison Electrolyte. Our list describes complete batteries, construction parts, enameled aerial wire, silicon steel. Available immediately, filament and plate transformers for the new 872-886 rectifiers, complete plate power units. Rectifier Engineering Service, 4837 Rockwood Road, Cleveland, Ohio.

THE finest in radio for amateur, broadcast and marine. The most modern short-wave receivers. Four to ten tube designs. Radiophone CW transmitters of any power or type. We make a complete line of apparatus, including speech amplifiers, filter coils, inductances, power units, etc. Any special apparatus, designs, built to order, using your parts if desired. Prices on request. New bulletin lists complete line of apparatus. Write for copy. Enall Radio Laboratory, 1527 Grandview St., S. E., Warren, Ohio.

GOOD crystals. Trade for meters and set testers. Herbert Hollister, Merriam, Kansas, W9DRD.

CRYSTALS scientifically manufactured. Fully guaranteed. Lowest prices consistent with highest quality. Our name on each crystal — your protection. Power-type (X) inch square to approximate specified frequency (0.1% calibration); — 1750kc, 3500kc bands — \$5.50. Dust-proof plug-in holder — \$2.50. Constant-Temperature Equipment: — Aluminum cylindrical Oven — \$3.75. Variable Mercury Thermostat — \$10.50, Thermometer — \$3.15, Special Relay — \$4.00, Heater Wire: 25 watts — \$0.50. Crystals ground to any frequency and precision from 25kc to 6000kc. We can do it — write us. Biley Piezo-Electric Co., Masonic Temple Bldg., Erie, Penna.

AUDIO trans. single stage. Straight line frequency condensers, 00035, 50¢ each. 4 inch dials 15¢. Jos McGuire, 5022 S. 38th, Omaha, Nebr.

CLOSING radio stock. All latest 1932 Philco and Atwater Kent superheterodynes, less than cost. Write for list. L. S. Pettygrove, W90EA, Oxford, Nebr.

BARGAIN 1932 National amateur receiver, a.c. tubes, filament transformer, \$28.98. W9C1Y.

WANTED: 203A, state price and condition. W8FDD.

SPECIAL units class B modulator. 245s to 210s. 245s to 203As. Write for prices. Amateur Service Sales, 2706 Warren Blvd., Chicago, Ill.

TRY Kruse's Modern Radio (Magazine) 4 months 50¢. Modern Radio, Hartford.

QSL cards, message blanks, stationery, snappy service. Write for free samples today. W1BEF, 16 Stockbridge Ave., Lowell, Mass.

FIVE-tube Pentode A.C. midget broadcast radio, \$12.50. Brand new Stewart-Warner short wave converter, \$19.00. Everything in shack must go at 5¢ and up. Write for list. W8PB, 7530 Maple Avenue, Dearborn, Michigan.

SELL or trade — little used 211D tube, \$6. 50 watt socket, \$1.25. D.C. superwasp with tubes, \$18. Will send C.O.D. W1AQP.

GET your new National receiver from W9DOQ, Route One, Duluth, Minn. Parts, crystals, real holders.

ACME — 500W plate transformer mounted, 1000-1500V each side, \$12; Acme 30H 600 M.A. 50 lb. mounted choke, \$17; Weston 425 T.C. 0-1½ radiation meter, \$6; Jewell 0-20V a.c. new, \$4; 40M transmitter, two 245s in push-pull, minus power supply, \$5. All guaranteed O.K. All letters answered. Box 83, Parma, Mich.

VIBROPLEXES, new and parts. Rebuilds, \$10. Lydeard, 28 Circuit, Roxbury, Mass.

TNT 245 PP transmitter, tubes, power supply, milliammeter. Fully guaranteed, \$18. W9ACO, West Lafayette, Ind.

TUBES: RCA, transmitting, receiving. Condensers: fixed, variable, filter. Resistances: any size, capacity. Transformers. Lowest prices, guaranteed, new. D. Smith, 316 Lynn, Ames, Iowa.

800 watt two cylinder 110-volt Kohler Power Plant, new four cylinder Elto Quad Outboard Motor, costing \$430.00; Fairchild Aero Boat costing \$325.00; Austin Coupe costing \$495.00. Want complete 500 or 1,000 watt phone transmitter, meters, 50 and 250 watt transmitting tubes, power and filament transformers, etc. State your best propositions or trade in first letter. 9CLO, Indianapolis, Ind.

FOR sale — Robbins Meyers motor generator, 110V, 60 cycle, 500V, .4 amp., Jewell d.c. mil. ammeter 0-500, Thordarson filament transformer 4-4-8 volts. Extra heavy duty filament radiostat. Radiotron UV211. Best cash offer. Bennett Black, 229 N. Madison, Bay City, Mich.

ONE DeForest 545, \$12.50; two Wright-DeCoster theater speakers, \$17.50 each — \$30 for the pair. Joe Suter, Winchester, Ill.

FOR SALE or trade. Condenser microphone with two stage amplifier, a factory job, complete, \$25. Also 504, 211E, parts cheap. W9ER, Timken, Kansas.

ESCO motor generator, 1000 volt half ampere, used about 25 hours. \$100 with filter and voltage divider. Also 503A tubes, \$17.50. W8DOJ.

QSLs. T. Vachovetz, Elmsford, N. Y.

R. F. chokes 20 to 200 meters unwound or wound, 3 slot 100 MA, 15¢ and 30¢, 5 slots 250 MA, 20¢ and 40¢. See our ad page 79 November QST. D & T Products Co., 68 E. McMicken Ave., Cincinnati, Ohio.

TUBES — Bargain prices on tubes of all types and ratings. Specially tested for transmitters. Write Howard Tube Service, 5508 Fulton St., Chicago.

CLASS B modulation transformers. Develop sixty watts audio power with two UX210 tubes as per QST specifications, \$10.50 per pair. Radio Labs., Kansas City, Mo.

SELL — Esco double commutator, 1000 volt, 300 watt, type R-113 generator. Requires 32 volts d.c. for field coupling included, \$50. Wayne Faith, Montpelier, Ohio.

100% Safety. Modern Radio four months trial subscription 50¢. Edited by R. S. Kruse, L. W. Hatry, Boyd Phelps, P. O. Briggs. Full refund if first copy returned unsatisfactory. Modern Radio, Hartford.

QSLs printed to order. Samples, prices on request. W2AEY, 338 Elmora Ave., Elizabeth, N. J.

CLASSY photo QSLs. W8DNT, Rochester, Mich.

THERMOSTATS mercury guaranteed plus or minus 0.05°C at 50°C, \$7; Thermometer angle, 49 to 51°C in 1/10° divisions, \$4.50; Temperature control oven, a.c. operated, \$50; WE212D tubes, new \$25. Walter J. Thomas, 2030 West Fort St., Detroit, Mich.

WANTED: National AC-SW5 Thrill Box with power unit. Also want Teleplex. F. W. Hart, Jr., E. Clifton Rd., Atlanta, Ga.

QSLs? QSLs? Printed made-to-order. Beautiful samples. W8DED, Holland, Mich.

SELL cheaply — three fine receivers and monitor, \$5-\$25. Parts, 211Es. Write W1AAM, Groton, Conn.

CRYSTALS: selected quality 160 or 80 meters, \$4. Blanks, \$1.75. Rough sawed quoted on application. Discounts to dealers. W8CXP, Sandusky, Ohio.

IDEAL box for short wave receiver. 3/16 aluminum stock, 8 x 12 x 7; no flimsy corners. \$9.85 postpaid in U. S. Fleming Radio Service, 80 Mt. Vernon St., Ridgefield Park, N. J.

GUARANTEED crystals — square X cut power type. 1750-3500 kc. bands, \$3. Plug-in holders, \$1.75. W8DLM, Rochester, Mich.

OMNIGRAPHS, Teleplexes, receivers, Vibroplexes, superheterodynes, transformers, meters. Bought, sold, traded. Ryan Radio Co., Hannibal, Mo.

PILOT super wasp and tubes. Best offer. W9DSZ.

AUDIO band-pass, low-pass: 5% standard moulded mica list prices .005 — 50¢, .01 — 75¢, .025 — \$1.85, .03 — \$2.10, .035 — \$2.40. Condensers matched, measured at extra cost. 200v. paper .01 — 45¢, .025 — 50¢, .03 — 55¢, .035 — 55¢ list prices. Also adjustable airgap chokes to hit 3.54, 1.77, 1.026, 2565 henrys or thereabouts, three sizes. Filters made to order. Usual discounts to amateurs. Hatry and Young, Hartford.

SEND 25¢ (postage cost) for latest amateur parts data. Kladag Labs., Kent, Ohio.

CODE machine, \$9.85. Norman Shattuck, Winchendon, Mass.

CRYSTALS \$3.50. Your frequency in 80 meters. Powerful oscillators. W6EIJ, 3760 Kelton Ave., Los Angeles.

TELEPLEX, first class condition. Complete net tapes, buzzer. Will trade or sell. W2CJH, 1663 Washington Ave., New York City.

POWER crystals: Guaranteed. Highest quality quartz crystals scientifically ground for maximum power. X cut, one inch square carefully ground to your approximate specified frequency 0.1% calibration. 1750 and 3500 kc. bands, \$5.50, 7000 kc., \$8. Ground to within 0.1% of your specified frequency; 1750 and 3500 kc., \$7; 7000 kc., \$14. Plug-in, dustproof holder with jacks, \$3. Prompt shipments. Precision Piezo Service, 427 Asia St., Baton Rouge, La.

ATTENTION phone hams! Condenser microphone heads, with an average response curve from 30 to 8000 cycles. Guaranteed. No background noises. \$15. W5ABO, 2924 West 21st St., Oklahoma City, Okla.

COMPLETE 1932 transmitter with 210 and two 281s. Ready for operation, \$30. Three tube receiver, monitor built in, \$20. Both \$45. No junk. Two rectobulbs R3, \$5 each. H. Brewer, Okaloosa, Iowa.

SHORTCUTS — Reading speed. Had raw YI, test "Radio" — copied nine per third evening. Schnell W9UZ, ex TM, ARRL, \$5. Terms. Dodge, Box 100, Mamaronck, N. Y.

TRANSFORMERS, chokes, kits, parts. List free. Class B modulation transformers. Dec. QST specifications, \$8.50 set. W6ELA, 1051 1/2 E. Ave. 38, Los Angeles.

SELL — Parts, tubes, mercury arc, cheap. W9DWA.

YOU can't lose. Modern Radio magazine edited by R. S. Kruse. Newsy, accurate. Full of information for experimenters, amateurs, service-men, radiofoners. 50¢ four months trial subscription. Modern Radio, Hartford.

GENERAL Electric 50 watt transmitting tubes same as 203A's. Used less than 50 hours, limited number available at \$12.50 each. Ohio Public Service Company, Box 693, Cleveland.

CLASS B transformers — pair 210 — \$14.00, 203A — \$17.00, 204A — \$28.00, 10,000V 866s — \$3.25 new, 2.5V et. fil. transformers for 866s — \$2.50, 10V-7A et. fil. transformers \$3.00. Brand new RCA 250s \$2.25. Quarter kw 8G tubes \$18.00 (used). Shielded single button mike transformers, exceptional quality \$2.00 new. National Type N dials \$2.25 used. 002-5000V Sangamos 45. Cash for bargains in transmitting equipment. List. E. Ewing, Jr., 29 S. LaSalle St., Chicago, Ill.

GENERAL Electric oil immersed filter condensers new, 1.5 mfd. 3500 d.c. working voltage. List \$141. Your price \$16. Trade for d.c. motor parts. W5AGQ.

FOR sale — Crystal controlled transmitter, 30 watts; c.w.; fone, complete with power supply. Receiver 3 tubes, photos furnished. Excellent performance. Reasonable. Write Joe DuPre, Beachwood, N. J.

CLASS B 100% modulation transformers, any tubes. Automatic voltage boosting regulating transformers. Deliver uniform voltage all loads. Rectifier Engineering Service.

WE are interested in contacting with amateurs in various parts of the country who have a following among other amateurs with a view to selling on a commission basis, a product of proved merit and of especial interest to all amateurs. Morrill & Morrill, 30 Church St., New York City.

TUBES, brand new. Large plates. Guaranteed. UX210s, UX250s, UX281s, UX222s, \$1.10 each, three for \$3. Cash or pay when delivered. Brewster Radio Co., Grafton, N. H.

TRANSMITTING tubes: Types: 211, \$7.50; 210, \$2.25; 866, \$2.50; 203A, \$15.50; 845, \$15.50; 872, \$15. All tubes guaranteed within RCA specifications. Silverman's, 66 S. 9th St., Brooklyn, N. Y.

FOR a limited time, I will trade you a new Jewell meter and take in your old Weston or Jewell meter, flange diameter 3 1/4 or larger, at 1/2 price of the new meter you order. Send old meter and cash with order. Lowell Ecker, Sedan, Kans.

GUARANTEED standards 50 kilocycle twenty dollars, 100 kilocycle ten dollars, 1000 kilocycle ten dollars, 3500 to 4000 plates five dollars. Gartland, 1405 Kenmore Place, Brooklyn, N. Y.

TRANSMITTERS, receivers or other equipment designed and built to specification. Can handle simple baseboard layout or fully mounted commercial type. Your parts used if desired. Engineering and construction guaranteed. Write for quotations. State your requirements in as much detail as possible. Holmes C. Miller, Radio Engineer, P. O. Box 105, Palo Alto, California.

NATIONAL SW3 \$31, DCSW5 \$40, ACSW5 \$52, power supply \$19; REL278 \$28; Rectobulbs R3 \$7.51; RCA 866s \$6.50; RCA 865s \$12; power crystals \$4.75; WE509W phones \$5; class B modulation transformers; 20% off any latest model Apex or Westinghouse broadcast receiver; Voigtlander imported cameras. Any other new apparatus. Henry's Radio Shop, Butler, Mo.

ALL types RCA and WE transmitting tubes, GE mercury arcs for AC or DC keep-a-live \$9, dynamotors, MGs, Omnigraphs, anything else. Write. — W9ARA, Butler, Mo.

SNAPPY QSLs. Send for samples. WSDWV, Ellwood City, Pa. SELL UV204A, \$40. W9ERU.

SELL four spare crystals. W9ERU.

3000V, 2 ampere double commutator motor-generator with filament generator \$750; 3000V, 1 ampere double commutator motor-generator \$450; 1000V, 1/2 ampere motor-generator \$85. C-Bias 1 ampere motor-generators \$85. Motors, generators, converters, etc. Queen City Electric, 1734 Grand Avenue, Chicago.

AMERTRAN PA-45 amplifier, complete. New, perfect. \$30 W9AXH.

JENSEN D-8 a.c. dynamic speaker with output transformer for 245s. New \$11. W9AXH.

TRANSFORMERS 200 watt 1100-1500-2000 c.t. \$8; 400 watt 1500-2000-3000 c.t. \$10; 600 watt 2000-3000 c.t. \$12.25; 700 watt 2000-3000-4000 c.t. \$14.50; filament trans. 10V 14A \$5. Polyphase and 25 cycle trans. W9CES, Frank Greben, 1917 S. Peoria St., Chicago, Ill.

FOUR Dubilier transmitting condensers, .004 mfd., 12,500 volts. Used but guaranteed, \$7.50 each. W. Jones, 5917 Edna Ave., Baltimore, Md.

QSL cards, two colors, \$1 per hundred. Free samples. WSDTY, 257 Parker Ave., Buffalo, N. Y.

SELL — Esco 150 watt direct coupled, two bearing, 500 volt motor generator 110 volt 60 cycle a.c. drive purchased from Queen City Electric, perfect condition. \$25. H. R. Lord, Cambridge Springs, Pa.

PRESENT W8BAH TPTG transmitter for sale \$98.00 complete. Neon Lamp 55¢, De Forest new 510 and 203A tubes in stock, Ward Leonard Bleeder resistors, Transmitting keys \$2.10, Crystal Holders \$2.50, Bliley crystals \$5.50, R. F. Chokes 65¢. Guaranteed 210 tubes \$3.72, type 281 rectifiers \$2.66. Postage paid in Central Division, cash or MO with order, send 25¢ cash or stamps for complete set of detail specification type catalogues on all parts handled. W8BAH, Harry A. Tummonds, Northern Ohio Laboratories, 2073 West 85, Cleveland, Ohio.

QSLs. Send for prices and samples. Maleco, 1512 Eastern Parkway, Brooklyn, N. Y.

QSL cards, message blanks, wall cards, stationery, etc. Hillcrest, Cranestville, Pa.

100 WSLs, 90¢. Stationery, samples. W3BHG, 3536 Roland Ave., Baltimore.

SELL or trade — Pilot d.c. super wasp and 6 volt dynamic speaker. W9DLC, Spruce, Mo.

WANTED: Condenser microphone, meters, transmitting tubes, transmitting variables. Trade crystals. Holders. W9DZM.

PRINTING process makes distinctive QSL cards, photographs, circuit diagrams. Anyone can do it. Samples 10¢. W9ANZ, 1718 South 14th, Lincoln, Nebr.

COPPER coils, 2 1/2" x 1 1/4", 7¢ per turn. Write for lowest prices on other sizes. Also for prices on condensers, resistors, etc. W2CHJ, Port Richmond, N. Y.

866 rectifiers, \$2.85; transformers, \$2.95; ham sheet. Hudson Amateur Service, Piermont, N. Y.

TRANSFORMERS: Uncased 60 cycle, 115 volt, 475 volts each side center. Two 7 1/2 volt 2.5 amps, and one 3 volt 10 amp. windings. \$2.50 cash or money order. Limited supply. W8DGV, Chas. Drescher, 1145 Erieview Rd., Cleveland Heights, Ohio.

POWER amplifier — Webster, 2 stage, 210 output \$10. A. B. Clark, Albion, Iowa.

METERS wanted — Weston 476, Jewell 78 and 88, any range or condition. A. B. Clark, Albion, Iowa.

REWINDING — speakers, \$1.75 to \$2.50, plate, filament and electric set power transformers, reasonable price. A. B. Clark, Albion, Iowa.

RECEIVER — a.c. or d.c. s.g. and pentode with bandspread feature, \$15. High grade dynatron frequency meter \$7.50. Push-pull mixer with coils, \$8.50. Shielded monitor with 3 coils. \$10.00. All above new and guaranteed. W9DKF, Peoria, Ill.

COMPLETE d.x. 50 watt H. C. Hartley, pdc power \$35. W9DRG, Owatonna, Minn.

WANTED — transmitting tubes. W9DWA.

WANTED: meters, transmitting tubes. Trade, sell: Power transformers, crystals 3505.5-3545-3645.8-7010. Guaranteed. \$5. W9ANY, 3327 College Ave., Kansas City, Mo.

CRYSTALS: 1" sections good oscillators, .1 of 1% accuracy. X cut \$6, y cut \$4. Finished blanks, \$2. Money back guarantee. R. L. Tedford, 3838 Columbia Ave., Cincinnati, Ohio.

IMPORTANT to you — see Irben Experimental Labs. advertisement on page 90.

BEST cash offer positively takes my a.c. hand-spread Superwasp receiver. Perfect condition. William Berger, 4648 La Mirada, Los Angeles.

QUARTZ — make your own crystal oscillators. Write us for full details. Direct importers from Brazil of best quality pure Quartz suitable for cutting into Piezo electric crystals. The Diamond Drill Carbon Co., 720 World Building, New York City.

CRYSTALS: See our advertisement on page 93 before ordering crystals. Premier Crystal Laboratories, Inc.

EXCEPTIONAL, transmitting filter condenser values! Morrill — 2 mfd.-700 VDC \$1.50; 2 mfd.-1000 VDC \$2.50; 2 mfd.-1900 VDC \$5.10; 2 mfd.-2700 VDC \$8.10. For amateurs who want the ultimate in quality at the lowest price. Morrill and Morrill, 30 Church St., New York.

NEW — Sectionalized R. F. chokes for high R. F. voltage. High impedance in amateur bands. Carries up to 500 ma. D. C. \$1.50 each list. Usual discount to amateurs Hatry and Young, Hartford.

NEVER before offered sample copy Modern Radio, Kruse's magazine, 15¢. Try it. Modern Radio, Hartford.

LEARN Wireless (Radio) and Morse telegraphy. School, oldest, largest, endorsed by telegraph, radio and government officials. Expenses low. Can earn part. Catalog free. Dodge's Institute, Wood Street, Valparaiso, Ind.

Q R A SECTION

50c. straight with copy in following address form only:

W6BRW — J. F. Smith, 1118 Emerson St., Palo Alto, Calif.

W8BZS — James B. Zecca, Raquette Lake, N. Y.

WIMK, A.R.R.L. Headquarters

R. B. Parmenter, Chief Op. "rp"

The following calls and personal sines belong to members of the A.R.R.L. Headquarters gang:

WIAKW-WIKP Clyde J. Houldson "ch."

WIBAW R. T. Beaudin "rh."

WIBDI F. E. Handy "fh."

WICBD-W9ZZF Clinton B. DeSoto "de."

WIAL J. J. Lamb "jim."

WIDF Geo. Grammer "hg."

WIEH K. B. Warner "ken."

WIES A. A. Hebert "ah."

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WIUE E. L. Battey "ev."



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Instrument Littelfuses: Amps.: 1/100, 1/32, 1/16 — 20c ea. 1/8, 1/4, 3/8, 1/2 — 15c ea. 1, 2 — 10c ea. For milliammeters, ham rectifiers, etc. Use 1/8 for radio B circuits.

High Voltage Littelfuses: 1000, 5000, 10,000 volt ranges in 1/16, 1/8, 1/4, 3/8, 1/2, 3/4, 1, 1 1/2, 2 amps. Renewable. Price — 35c to \$1.25 each. Get new catalog No. 4-A. "Quicker than a Short-Circuit"

LITTELFUSE LABS. 1772 Wilson Ave., Chicago

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OF ALL TYPES

Write for Details

SHURE BROTHERS COMPANY

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S. N. SHURE, Pres.

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CORNELL "CUB" CONDENSERS

Single mounting strap — can be attached to panel — initial cost is less — most flexible and easiest mounting — no loss in efficiency — reduces costs by cutting assembly operations — high insulation resistance — extraordinary dielectric strength. Write for Circular.

CORNELL ELECTRIC MFG. CO.

Long Island City New York

SPECIAL BUILDING

Receivers, Transmitters, Monitors, etc. Sound amplifiers for recording, etc. Power Packs, Associated apparatus, public address.

Under Direction of L. W. Hatry

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Formerly: Recording Engineer, Brunswick; Chief Recording Engineer, Crown Record, etc. Designer of cutters for recording, other similar equipment now in use, talking movie recorder, etc.

State complete requirements when writing for estimates. Prompt mail-order service on standard parts.

HATRY AND YOUNG, INC.

203 Ann Street Hartford, Conn.

Oscillating Crystals

Precision ground, scientifically inspected, powerful oscillators

UNCONDITIONALLY GUARANTEED

"X" or "Y" cut-ground to your approximate specified frequency and calibrated to one-tenth of one percent or better.

80- and 160-meter bands	\$5.25
40-meter band	10.00
1-inch oscillating blanks	2.50
Unfinished blanks	1.50
Dustproof holders, with nickel-silver electrodes	2.25

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QST'S INDEX OF ADVERTISERS IN THIS ISSUE

Allen-Bradley Company	2
American Piezo Supply Co.	77
American Sales Company	87
Areturus Radio Tube Co.	83
A.R.R.L. Apparatus	84
A.R.R.L. Application Blank	94
A.R.R.L. Emblem	78, 87
A.R.R.L. Handbook	Cor. II, 86
Blan, The Radio Man, Inc.	83
Bud Radio, Inc.	79
Candler System Company	77
Cardwell Mfg. Corp., Allen D.	96
Central Radio Laboratories	90
Coast to Coast Radio Corp.	86
Columbia Specialty Company	80
Cornell Electric Mfg. Co.	93
Cunningham, Inc., E. T.	74
DeForest Radio Company	1
Delta Manufacturing Co.	83
General Radio Company	79
Gross Radio Company	71
Gulf Radio School	76
Harrison Radio Company	82
Hatry & Young, Inc.	93
Hollister, Herbert	81
Hoodwin Company, Chas.	93
Hytron Corporation	79
Irben Experimental Labs.	90
Jacobs, Chas. F.	89
Jewell Electrical Instrument Corp.	4
Jewell Radio Company	72
Leeds Radio Company	95
Littelfuse Laboratories	93
Manhattan Electric Bargain House	65
Massachusetts Radio & Telegraph School	83
M & H Sporting Goods Co.	75
Morrill & Morrill	85
National Company	70
New Jersey Radio Supply Co.	85
Odeon Mfg. Company	87
Port Arthur College	89
Powell & Co., Inc., R. C.	81
Premier Crystal Labs.	93
Radio Engineering Labs.	73
Radio Manufacturers' Supply Co.	89
Radio Supply Company	85
RCA Institutes, Inc.	66
Rooney, John T.	83
Sangamo Electric Co.	77
Schwartz & Son, Maurice	76
Scientific Radio Service	89
Shallcross Mfg. Company	81
Shure Brothers Company	93
Telephoto & Television Corp.	85
Teleplex Company	87
Thordarson Electric Mfg. Co.	68
Uncle Dave's Radio Shack	67
United Radiobuilders	69
Universal Microphone Co.	89
Vacuum Tube Exchange	81
Vibroplex Company	88
Wagener Radio Service	81
Webster Electric Company	88
West Side Y. M. C. A.	80